NATIONAL EDITION

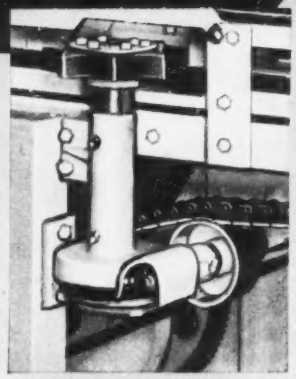
Food Industries

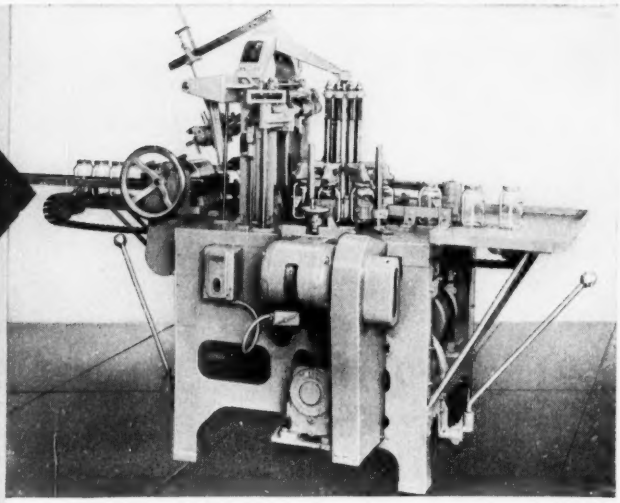
For those who control quality and costs through management and production — a McGraw-Hill publication

Advanced engineering doubles capacity of Carling's brewery. Efficient new lauter-tub installation shown here. (See p. 60)

MARCH, 1950: Instruments improve processes, Safety at Heinz, Control of insects, Flame-sprayed coating, In-plant chlorination, Watching quality

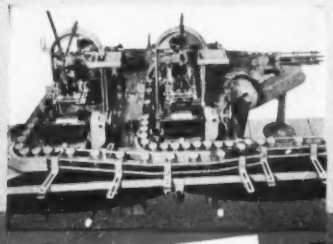
No "Traffic Jams"





This does it:

Close-up view of the Free-wheeling Starwheel Feed Spacer. However erratic the delivery of containers ahead of the Starwheel, this ingeniously engineered device controls the feed for continuous, precise, profitable labeling. The *free-wheeling* action causes any out-of-position container to get back into line at the right time. The entire action is automatic — avoids jams and breakage — prevents costly delays — makes the WORLD *Turret* the ideal Labeler for odd-shaped as well as standard containers. Note Starwheel ahead of each infeed on *Twin-Turret* (below).



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HIGHLIGHTS

Synthetic vitamin A production is substantially increased by a new Hoffmann-La Roche plant at Nutley, N. J. More companies will enter this field soon, putting producers of the natural vitamin up against some tough competition.

Thomas M. Rector, General Foods vice-president in charge of research and development, has been chosen 1950 Nicholas Appert medalist by the Chicago section, Institute of Food Technologists. As in previous years, the award will be presented at the national meeting of IFT, to be held in Chicago in May. 'Tis an honor well deserved.

Campbell Soup makes a grant of $1,000,000 to MIT to support the school's research in food technology, biology and related engineering and scientific subjects. As a result, the department gets a new building in memory of John T. Dorrance, Campbell president from 1914 to 1930. This grant undoubtedly will help to accelerate progress in food processing. And industry leaders hope that it may portend a trend. (See News section)

Estimates on orange juice concentrate production for 1950 have been revised downward—from 30 to 20 million gal.—because of the late Florida crop. Higher retail prices—forced above 30 cents per 6-oz. can by zooming growers' prices—will not help, either. So 1950 may see production drop to a mere 100 percent increase over last year.

Polyethylene now can be sprayed on food processing equipment to achieve corrosion resistance. By adding a small quantity of graphite to the poly, preheating the target to 400-500 deg. F., and using a softer flame gun than is usual in metal spraying, the coating can be applied readily to the steel. (See p. 82)

Something new in a heat-pump refrigerator—which will either cool or heat its load—has been developed. Successful in transcontinental test runs, the car is equipped with a Freon compressor driven by a 26½-hp. gasoline engine. Auxiliary refrigeration can be used to cool the load. (See p. 50)

An odorless fish processing plant has been achieved by Gorton-Pew Fisheries Co., Ltd., at Gloucester, Mass. The trick is in-plant break-point chlorination of water used in processing and to kill bacteria on the floors. Spoilage is reduced, quality improved. Needless to say, the employees are happy. (See p. 48)

To speed accurate determination of sweet corn maturity, Western Regional Research Laboratory has developed a better way to measure moisture in the kernels. A reliable index to maturity, and hence to canning quality, moisture content is determined by a calcium-carbide weight-loss method. (See p. 75)

Incoming cans are unpacked and lined up automatically by a unit recently developed by Bruce Engineering Corp., San Francisco. Cases enter machine as they arrive from warehouse or freight car. Flaps are opened and cans held by magnetic force as empty case falls to lower level conveyor. Cans are carried to filling machine by another conveyor. Eliminates work of at least two men. (See Equipment section)

Teflon—that amazing plastic—now has a rival. It is Kel-f, known to the chemist as poly-tri-fluoro-chloro-ethylene. Like Teflon, it has properties which intrigue the food processor. Things do not stick to it. It is highly resistant to corrosion, very hard, and withstands 500 deg. F. But it's a bit expensive—$30 to $50 a pound.

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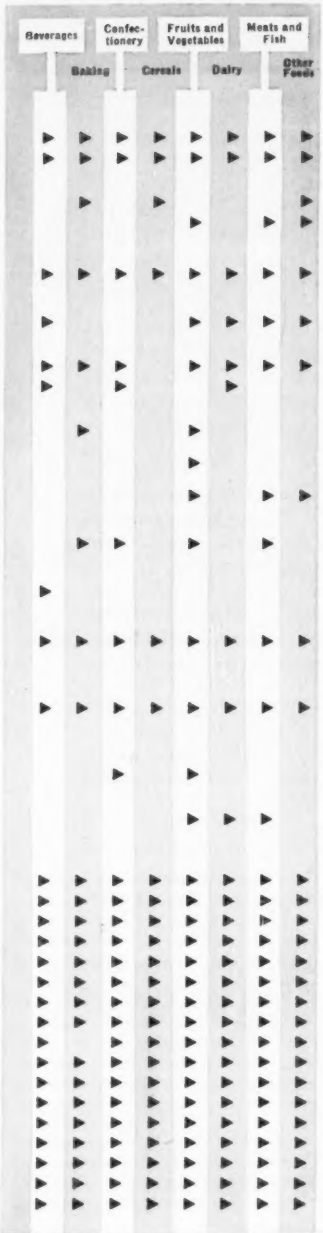

Food Industries

MARCH, 1950 • VOL. 22, NO. 3

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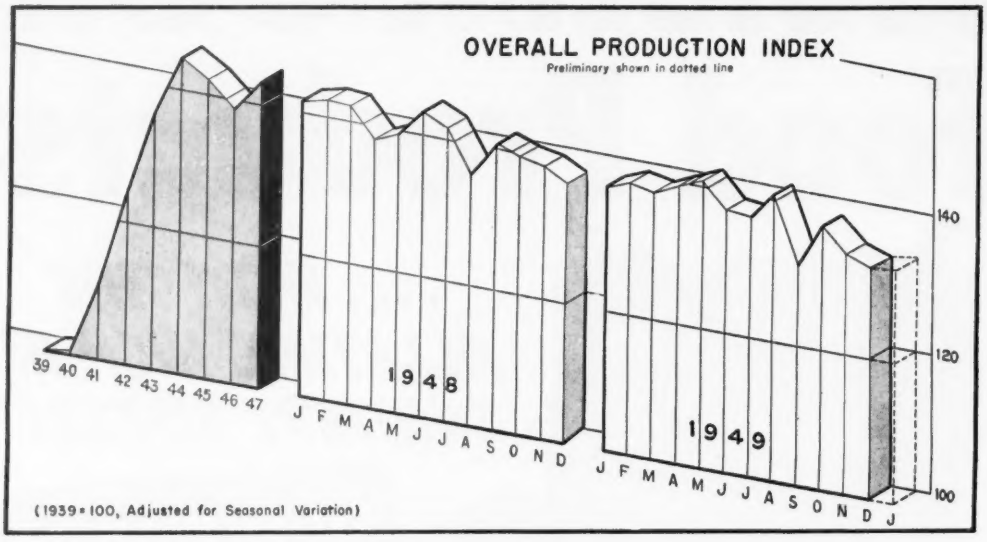
FI Index and Outlook


OVERALL PRODUCTION INDEX
Preliminary shown in dotted line
39 40 41 42 43 44 45 46 47
1948
J F M A M J J A S O N D
1949
J F M A M J J A S O N D J
140
120
100
(1939=100, Adjusted for Seasonal Variation)

Last-Summer Forecast Holds True; Recent Decline in Output Halted

Canned fruits and vegetables and meat products run close to form despite commodity variations

WITH the preliminary figure for January gaged at 133, the steady decline in overall food production, which set in during the final 1949 months, comes to a halt. The preliminary December index of 132 held up under the later scrutiny that established the final figure.

The increase in evaporated milk production resulted from the year's operational pattern. Heavy inventories had held production down through all of 1949 and the sharp dip in October and November represented an undercut. So the December upswing was simply an adjustment. A 2 percent heavier milk flow for the late months of 1949 may also have contributed to the increase.

Activity in the canning industry has held close to FI's summer forecast. Then we said that the 1949 pack would turn out almost as big as 1948. For the full year 1949, the index of canning activity averaged 3.8 percent below the previous year. But some of the decline may be attributed to lower production of non-seasonal items in the early months.

The pack of major fruits and vegetables, as reported by the National Canners Association, actually topped 1948 by a small amount. Larger packs of green and wax beans nearly offset the sizable drop in packs of tomatoes and tomato juice.

Corn and Tomatoes

An important item to note is the relatively small decrease in the 1949 pack of corn, despite lower acreage. Stocks are now higher than expected. And 1950 plantings will have to be reduced accordingly. On the other hand, canners' stocks of tomatoes and tomato juice are better balanced than last year because of the smaller pack during the past canning season.

Distributors' stocks of canned fruits and vegetables are reported higher overall than a year ago. However, inventories of "heavy volume" items are below last year, except for green and wax beans, pears and pineapple.

At a Glance

(1939 = 100, with all figures adjusted for seasonal variations.)

	Dec. 1949	Nov. 1949	Percent Change	Year Ago
Baking	123	125	−2	130
Butter	87	87	....	76
Canning	144	153	−6	158
Cheese	150	144	+4	174
Confectionery	134	130	+3	132
Evaporated Milk	140	104	+35	132
Flour	112	112	....	131
Ice Cream	176	187	−6	193
Malt Liquors	150	145	+3	156
Margarine	284	268	+6	267
Meat Products	138	143	−3	138
Sugar	103	96	+7	81

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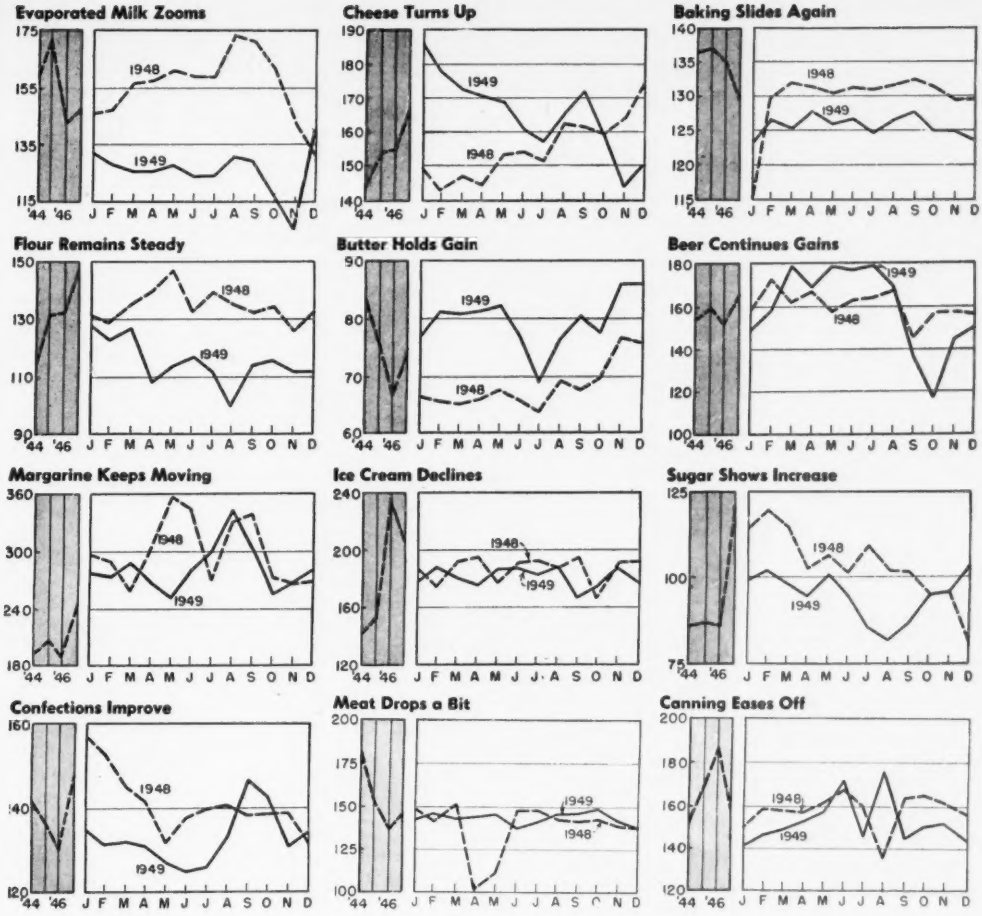

From this, it appears that the canners should have an easier time moving the recent pack to consumers than last season, although certain items, such as corn and beans, may lag.

Pork Running High

Meat packing will about match its 1949 record in the first quarter. Production of pork is running slightly higher. But beef supplies are somewhat lower. By April, output should begin to show substantial gains. The big crop of pigs farrowed last fall will be coming to market during the second quarter. This pig crop is 10 percent larger than last year's. About the same number of cattle are on feed in the corn belt as a year ago. But late marketings will mean peak slaughter in the second quarter.

The second-quarter rise in production is expected to mean about 1 lb. more of meat per person than in the corresponding months of 1949. The full gain should be reflected in retail consumption, since inventories are at a normal level for this season. In the second half of 1950, consumption per person will probably be larger than in the same period of 1949. The third quarter may not be up much. But considerably more meat is likely to be produced and sold in the closing months of the year. Another large pig crop will be available for fourth-quarter slaughter.

Canned Packs Held Up in '49

Packs of Major Fruits and Vegetables Canned in 1949, and Comparisons With 1948

	Thousands of Actual Cases		
	1949 Pack	1948 Pack	Change in 1949
Major Fruits			
Apricots	2,629	5,011	−2,382
Sweet Cherries	1,996	952	+1,044
Peaches	20,419	18,044	+2,375
Pears	6,371	4,395	+1,976
Total Fruits	31,415	28,402	+3,013
Major Vegetables			
Peas	24,945	24,446	+ 499
Corn	33,138	34,410	−1,272
Green & Wax Beans	19,303	14,133	+5,170
Tomatoes	18,874	21,467	−2,593
Tomato Juice	20,560	23,701	−3,141
Total Vegetables	116,820	118,157	−1,337
Total Major Items	148,235	146,559	+1,676

The FI Canning index for September has been revised upward on the basis of higher productivity per man-hour which resulted from the bigger bean pack (largely mechanized) and smaller tomato pack (mostly hand work).

The Talk of the Industry

Frozen Milk Coming in Only Two Years?

It will be "at least two more years before frozen concentrated fresh milk is ready for marketing. It is the most exciting project on the horizon right now. It could change the entire milk distribution picture."

Those statements, by Minute Maid's president, John Fox, will warm the hearts of frozen food packers. But they will chill many milk plant operators to the marrow. A dairy technologist might well ask: "What do you mean 'at least two more years?'" That is practically tomorrow for such an industry-shaking development.

Mr. Fox admits that there are problems to be solved, the principal one being to prevent the precipitation of protein solids when the milk is concentrated from 24 to 6 oz. But apparently he has confidence in the ability of technologists to overcome this difficulty.

If they succeed, it is likely that consumers who have been "conditioned" by using frozen concentrated orange juice will go for frozen concentrated milk in a significant way. This is especially true if the product is priced favorably as a result of savings through country-plant processing, lower distribution costs, and ability to store milk processed during the peak production season.

Whether or not people in the dairy industry believe that concentrated fresh milk is technologically possible, they will be well advised to keep an eye on developments.

Don't Learn the Hard Way

How would you like to be in the shoes of the corn miller who had 80 percent of his meal rejected by a large buyer because of high insect-fragment count? Or in the position of a butter maker who almost lost his business to a big outlet because of short-weight packages?

The miller and butter maker to whom we refer got into these embarrassing predicaments through no chicanery, but rather through carelessness or failure to adopt improved practices. Both were straightened out by their buyer's technologists, who passed along a little modern know-how—on plant sanitation and housekeeping in the one case, and on control through systematic check-weighing in the other instance. But both risked the loss of important business.

The moral is: Keep informed about the best practices and adopt them.

Ancient Art of Fish Farming Revived

Two-and-a-half-thousand years ago, the Chinese operated fish farms—ponds in which fish were systematically cultured. In recent years, the Japanese have cultivated fish in rice fields, not only producing "meat" but benefiting paddy crops as much as 10 percent. During the recent war, when marine fishery resources could not be fully utilized, fish farming proved to be a most valuable asset in several places. In the Philippines, Hong Kong, and Siam, fish cultured in ponds formed the main protein food.

Fish farming is said to have its highest application in tropical countries. But in this country there is now a growing interest in it. And think what a lot of well-run local inland fish ponds might do to the coastal and lake fisheries!

With the piscatorial professors propounding the merits of artificial insemination of carp and such, you can see how far this thing has gone.

Fertilizer Shortage May Pinch Processors

The strike at Carlsbad, N. M., which began in November, cut off a large part of the normal supply of potash for fertilizer to be used this spring. For canning crops that are successful only when very fully fertilized, there may be serious trouble ahead for the whole season. If such difficulty is anticipated, it will be important to see whether fertilizer companies—or perhaps even government officials—cannot help insure at least the minimum requirements to avoid serious food processing difficulties.

On the bright side, maybe this strike will help Secretary Brannan to solve his serious surplus problem.

Phenomenal Pickle Progress

Pickles have passed tomatoes and broken into the big-three category. It used to be peas, corn and tomatoes. Now it's peas (28,000,000 cases), corn (26,000,000), and pickles (25,000,000). Current consumption is at an all-time high—the outlook bright. With a small carryover, demand could even exceed supply.

Promotion-wise, it seems that National Pickle Week was a dilly.

Hors d'Oeuvres

■ A news item relates that a firm producing caviar from southern California sea urchins is headed by Earl Warren, Jr., Julius Drown, Tom Moore, L. Burridge, "and the Japanese couple who know how to make caviar from sea urchins." Hope they aren't overloading the payroll with nameless help.

■ To freeze whole eggs, a Louisiana State researcher draws off the "free water" in the egg, according to *Farm Journal*. It is this water, the man says, that separates from the white in storage eggs and "picks up odors and a strange flavor." Suppose it's strange at first, but that flavor gets mighty familiar awfully fast.

■ "Beef Shippers Are Bullish," says a news item crossing the desk. Golly!

■ It took two USDA researchers two years of intensive work to finally make it possible for us to tell you that a cup of black coffee is not an adequate breakfast. Being more complicated, it will take a while longer to determine that a cup of coffee with cream is not adequate, either.

■ And if you think a food processor can be too careful, hark! A housewife recently sued one for damages, alleging that she ate spoiled mayonnaise and became violently ill. This sickness threw her biological cycle out of phase, she says, leaving her susceptible to an attack of pregnancy. On the other hand, what other processor could make such a claim for his product.

J.A.J.J.

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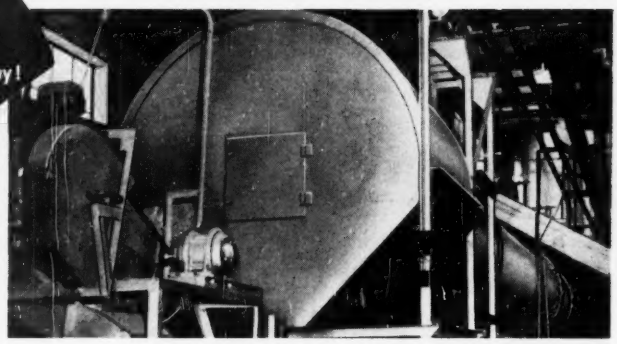

FORMER DRYER

Installed cost	$60,000
Annual production (tons)	6,000
Drying cost per ton	4.65

(space required, 2500 sq. ft.)

LOUISVILLE DRYER

Installed cost	$15,000
Annual production (tons)	9,000
Drying cost per ton	1.15

(space required, 1000 sq. ft.)

YEARLY SAVINGS of LOUISVILLE DRYER in OPERATING COSTS ALONE $21,000

Other General American Equipment:
Turbo-Mixers, Evaporators, Thickeners, Dewaterers, Towers, Tanks, Bins, Filters, Kilns, Pressure Vessels

When production costs are eating up profits, here's something worth looking into. This food processor was using a large, costly installation for drying until he asked a Louisville engineer to survey his production.

A dryer was designed specifically for his operations. Its performance was pre-determined in our own unique research laboratories and pilot plant. *The new dryer turns out better, more valuable production in less space—with great savings in annual operations.*

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What Washington Thinks

PROCESSOR WANTED — Safflower seed is prospectively a new oil crop in the United States yielding a drying oil like linseed and a protein press cake of important feed value. Food industrialists may be interested, because the oil also can be used for edible applications. Most significant at the moment is the fact that the Department of Agriculture, which has been encouraging the growth of safflower as a valuable crop in the semi-arid wheat territory, feels that one present need is more processing capacity near the source of safflower seed.

WHAT IS "EVIDENCE"?—One item that has delayed the enactment of the proposed law which would encourage goods pricing on a delivered basis has been a difficulty of the Department of Justice. That agency has complained to the law makers that the proposed measure would make it difficult to convict offenders, because of the character of evidence that would be required in order to prove violation of the Clayton Act. This is a particularly illuminating sidelight on the recent effort of Federal Trade Commission and Justice Department people, who seem to be bringing charges of illegal action on the basis of very flimsy evidence.

RAW MATERIALS—Quality food cannot be made from inferior raw materials. At least this is generally the case, hence food technologists, whose companies use butter, eggs, and comparable materials at any stage, will be interested in a number of recent publications of the Department of Agriculture that clarify the requirements and specifications for various grades. "Know Your Butter Grades" is the title of one of these, issued by PMA as its Folder L264. Another is leaflet PA79 on "Deterioration of Egg Quality During Marketing." These and other publications furnish a precise basis for buying practice. Technologists as well as purchasing agents of food firms might well get acquainted with them.

TIE BIDS—When the government buys goods by competitive bidding, tie bids sometimes result. Until lately, the flip of a coin decided which of two equal bids would be accepted. Latest federal policy permits choosing from equal bids the one that comes from the small business concern, or the concern that will fulfill the contract in an area where unemployment is serious.

POTATO FLOUR—Last year, about 350,000,000 lb. of potato flour were made by 60 firms from surplus potatoes. Thus one of Uncle Sam's headaches has afforded raw material for important food relief in the European areas, where potato flour can be successfully distributed because it is a recognized household raw material. This achievement of mutual benefit to Europe and to the U. S. government came from experimental work at Eastern Regional Research Laboratory of the Bureau of Chemistry. The technic involved grinding of washed, unpeeled, whole potatoes, treating the pulp with sulphur dioxide to control color, and drying in a steam-tube dryer. The product was re-ground, screened, and bagged like flour. Though the end product does not find ready takers on the American market, it is a real achievement of food technology benefiting the hungry folks of Europe. (Also see FI, Aug.'49, p. 80.)

LONGER SEASON—Production of citrus puree on a commercial scale has been made economically more attractive by off-season use of existing equipment normally used for processing deciduous fruits. The longer use each year of such equipment affords a substantial advantage in lower capital cost. This is simply one of numerous cases in which broad industrial planning is necessary in order to include several different, often diverse, types of activity in a single enterprise, which can thus succeed despite the fact that each of its several parts might not alone survive.

BETTER POTATOES—Growers and shippers of potatoes in Maine are offering a better quality under a new grading system. This has received official encouragement in Washington. It was well established that the buying of potatoes as surplus during the past year or two has resulted in delivery of poor quality at retail. Potato consumption fell off markedly in some places. Even though there is a surplus, it is now evident that the best quality should not be bought by Uncle Sam for destruction. Only poor grades should be treated as surplus when both good and poor are available in the surplus areas. Again, "quality pays".

INSECTICIDES DEFINED — To minimize confusion among buyers, sellers, and users of insecticides, the Bureau of Entomology has prepared a list of simple definitions of approximately 70 insecticides that the Bureau recognizes as useful in vegetable and fruit growing. This is by no means a complete list, nor does it include all items of substantial importance to growers. But it does somewhat simplify the problem that frequently confronts the food man who is concerned with the crops in the fields or with deleterious residues on his raw materials.

ARTIFICIAL SHADE—To keep cattle more comfortable in the field in extremely hot weather, the Department of Agriculture has been studying certain artificial shade facilities. Double-roof shelters with sprinklers, of course, take first place. But there are many other well-demonstrated means for reducing heat penetration. It looks as though the food technologists who want to keep some building areas cool may find some clues for their storage and factory improvement. Most obvious is the fact that a reflecting roof retains the least heat to penetrate inside. That obvious fact is often forgotten or ignored needlessly, with lower effectiveness or needlessly high cost of cooling facilities. To cite one simple example, it may be cheaper to use aluminum paint on the roof than it would be to add further refrigerating capacity.

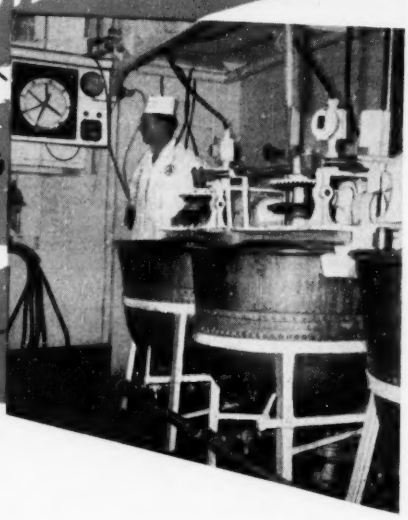
DONE BY 4 PERCENT—Last year, egg prices were supported by government purchases of approximately 4 percent of the eggs laid. The result was an average farm realization of about 45c. a dozen. The government was satisfied with this result because eggs declined less in price last year (compared with the year before) than did many other farm commodities. The 1950 price support program contemplates farm realization of about 37c.

A COFFEE PROBE—Senator Gillette promises the public that he is going to probe coffee prices and, later on, find out why bread costs so much. It is the perennial problem of "who is the profiteer?" Food processors are going to require the usual Washington representation to feud against unearned criticism needlessly hurled.

—R. S. McBride, Washington, D. C.

A WHOLE NEW CONCEPT OF INSTRUMENTATION
IS REVOLUTIONIZING THE FOOD INDUSTRY
FROM COAST TO COAST!

PIN-POINTED TEMPERATURE CUTOFF ...WITH BROWN *ElectroniK* CONTROL ...KEEPS BATCH COOKING ON THE BEAM



HAPHAZARD reading of end-temperatures and slow-motion cutoff are particularly costly in jam and jelly cooking.

Mr. Mark Gehlar of the Oregon Fruit Products Company, in Salem, Oregon, was one of the first preservers to do something different about the profits, taste and quality that go up in steam. He utilizes the extreme accuracy and high speed of the Brown *ElectroniK* Controller combined with a unique insertion of the thermocouple in the discharge pipe . . . to pin-point temperature cutoff and keep product concentration within ½° Balling. This is four times better than he was able to obtain with the closest human supervision.

ElectroniK Control Systems are setting the pace in similar installations throughout the Food Industry. Call in your local Honeywell engineer for an appraisal of control needs for your processes . . . he is as near as your phone!

WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL
COMMERCIAL • RESIDENTIAL • INDUSTRIAL

Creative instrumentation is the engineered application of cost-reducing instruments and controls.

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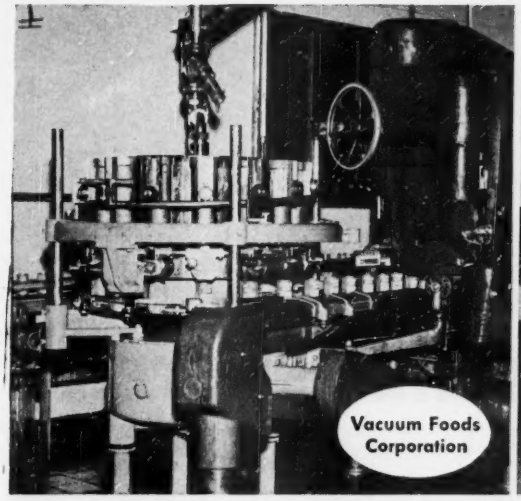
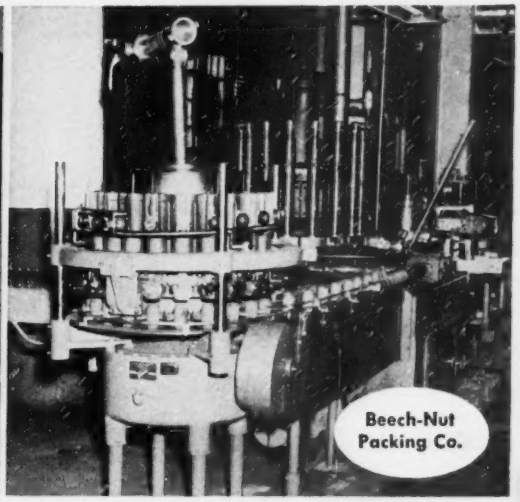
Honeywell — *Creative Instrumentation* FOR THE FOOD INDUSTRY — BROWN





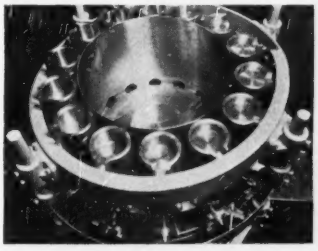
Dependable and accurate at high speeds . . .

Pfaudler Piston Fillers

You can do more filling jobs with a Pfaudler Piston Filler than any other machine available!

Proved performance. Here is a machine that is used by such companies as Vacuum Foods Corporation for filling frozen orange juice; Beech-Nut Packing Company for filling baby foods; Republic Foods for filling potted meats—to mention a few products. It handles everything from thin liquids to semi-solids and is easily adapted to changing requirements. With a single machine you get maximum operating flexibility.

Outstanding capacity. Pfaudler Piston Fillers are available in two sizes—14 and 21 stations. The smaller machine handles up to 350 No. 2 containers per minute; the larger, up to 575 per minute. Standard minimum openings 1½" diameter. Special nozzles are available for use on openings as small as ¾" diameter.



Cost-cutting features. High speed accurate filling is achieved through precision-timed two port valves. On the upward stroke of each piston, one port of valve opens and feeds product into piston cylinder. On downstroke of piston, opening port closes and discharge port opens, allowing product to fill container. *If there is no container under valve, valve ports automatically reverse, forcing product back into filler bowl.* Waste is eliminated. Adjustment of valves for different size containers is done in one simple operation, saving time. Get the complete story. Ask for Bulletin 848.

Pfaudler

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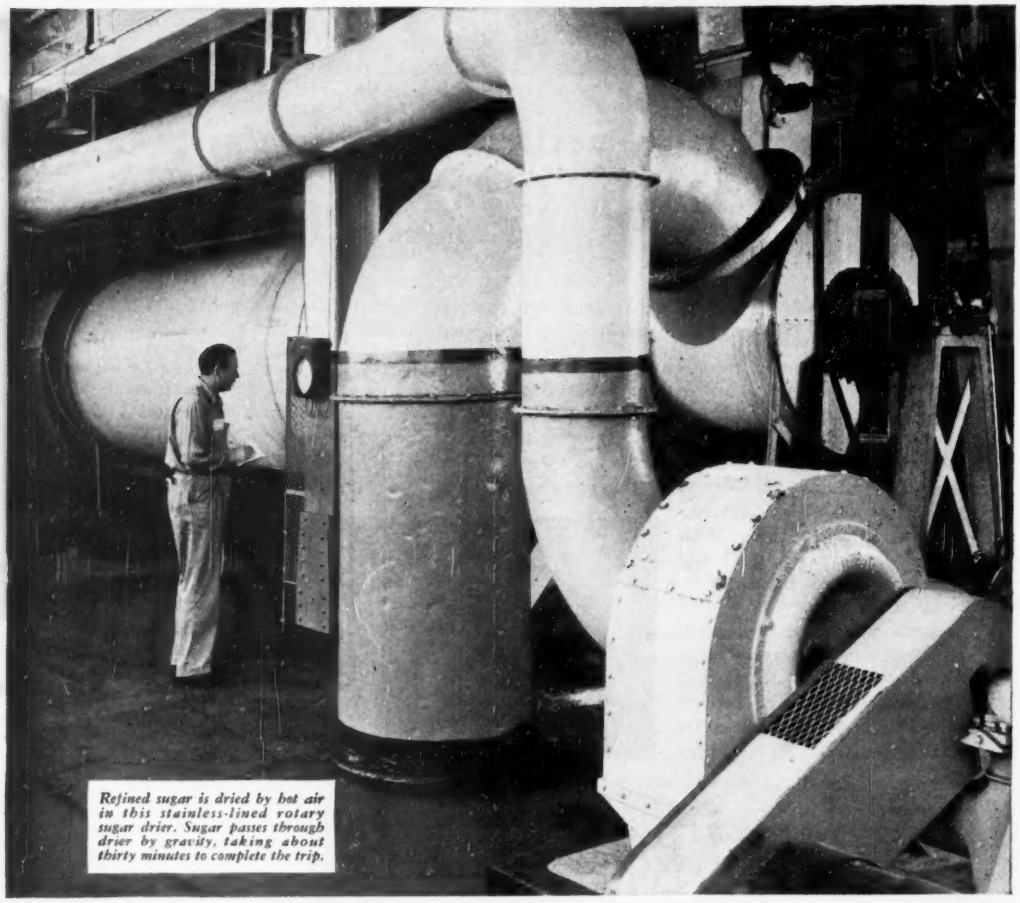
THE PFAUDLER CO., ROCHESTER 3, NEW YORK

Engineers and Fabricators of Food Processing Equipment

GLASS-LINED STEEL
Hastelloy—Aluminum
Tantalum—Carbon Steel
Solid or Clad Stainless Steel
Nickel, Inconel, Monel

Enduro®

STAINLESS STEEL



Refined sugar is dried by hot air in this stainless-lined rotary sugar drier. Sugar passes through drier by gravity, taking about thirty minutes to complete the trip.

REPUBLIC STEEL

REPUBLIC

Alloy Steel Division, Massillon, Ohio • **GENERAL OFFICES**

THRIFTY METAL OF 10,000 USES

Scalper Screens of ENDURO Stainless Steel and Enduro-lined Rotary Sugar Driers see to it that from corn kernel to refined sugar the process is without contamination. Wherever food is processed, maintenance of quality, color, flavor is assured when its only contact is ENDURO.

SILVERY LINING...TO SWEETEN PROFITS

The smooth, silvery ENDURO lining of these Rotary Sugar Driers does just that —*sweetens* profits.

ENDURO Stainless Steel sweetens profits by cutting maintenance and processing costs. It is easy to clean and keep clean. It is highly resistant to rust, corrosion, most acids and alkalies—hot or cold. With ENDURO in the process lines, there is little interruption of processing, little "down-time" to dilute profits.

ENDURO also sweetens profits by guarding product quality—color, flavor, clarity —and with it, public acceptance and sales. ENDURO is chemically inert—does not in any way alter the characteristics of the product in process. Its smooth, pore-free, sanitary-as-glass surface affords no foothold for bacteria or contaminants. Purity is assured with ENDURO.

Added to all this—its unusually long, trouble-free life makes it long-range economy to equip your process line from start to delivery with ENDURO—*profit sweetener!* Ask your equipment manufacturer for details today!

✓ ***Check All 10 Advantages:*** • RUST- AND CORROSION-RESISTANCE • HEAT-RESISTANCE • HIGH STRENGTH • NO METALLIC CONTAMINATION • SANITARY SURFACES • EASY TO CLEAN • EYE APPEAL • EASY TO FABRICATE • LONG LIFE • LOW END COST.
What More Can Be Desired in a Material?

STEEL CORPORATION

CLEVELAND 1, OHIO • ***Export Department: Chrysler Building, New York 17, New York***

What's so "New" about the New 1950 York V/W Ammonia Compressor?

IT CAN'T WEAR OUT!

FOR A FACT, you can't wear out a 1950 York V/W Ammonia Compressor! And the reason is simple: *Every part subject to wear is renewable!*

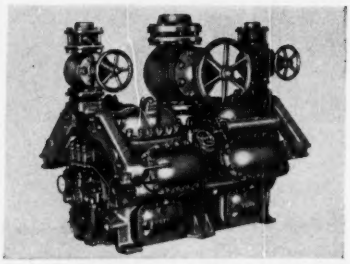
All you do is slip out the worn part, and slip in a new one. Not a "special" repair part oversized, for instance, to compensate for machining, but an identical component, resulting in new-machine efficiency, with all parts still standard in size—and all parts still renewable with standard replacements.

In addition, the parts of all York V/W Ammonia Compressors—for high-stage or booster operation—are interchangeable, cutting down stock-piling of spare parts.

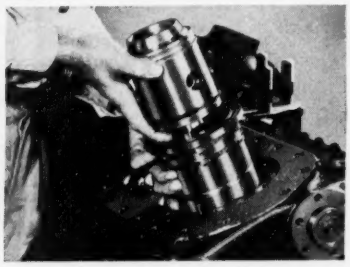
Simplicity of design, speed-and-ease of repair *pay off* in preventing production losses if shut-downs should occur. In less than four hours, even the large capacity 16-cylinder "V/W" can be completely rebuilt by one man.

For industrial or processing refrigeration, the new 1950 York V/W Ammonia Compressor—4, 6, 8, 12 and 16-cylinder—has built-in flexible capacities that make it universal in application . . . operates with any type of prime mover, including steam turbine, permitting use of low pressure or waste steam.

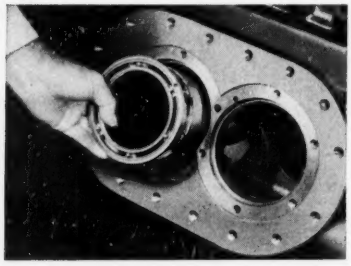
Let your nearest York Representative match his time with yours to discover *where* and *how* the 1950 York V/W Ammonia Compressor can save you money . . . improve your product. No obligation, of course. York Corporation, York, Penna.



Pistons are pulled with simple hand tools. No heavy chain blocks, or back-breaking, time-consuming labor.



The cylinder walls are hand-removable liners. Smooth, durable, high-polished, offer long, efficient service.



BE SURE YOU GET THESE YORK EXTRAS IN YOUR NEXT AMMONIA COMPRESSOR!

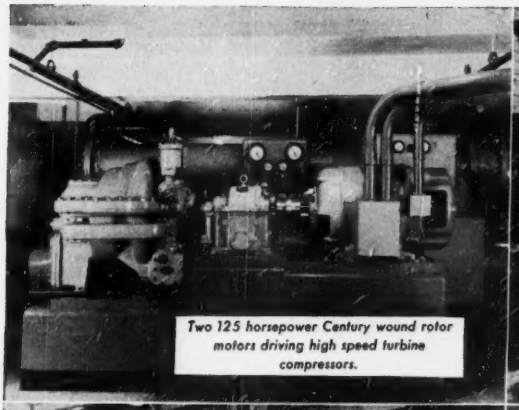
1. LOW INITIAL COST.
2. LOW OPERATING COST.
3. LOW MAINTENANCE COST.
4. SPACE-SAVING COMPACTNESS.
5. SIMPLIFIED MOTORS & STARTING CONTROLS.
6. VIBRATION-FREE OPERATION.
7. FILTERED LUBRICATION.
8. POSITIVE LUBRICATION.
9. POSITIVE SHAFT SEAL.
10. BOOSTER AND/OR HIGH-STAGE OPERATION.
11. COMPLETE NEW LINE.

York refrigeration air conditioning

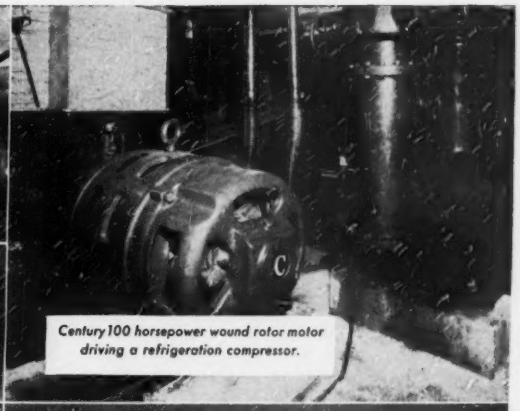
PIONEERS IN INVENTION AND DEVELOPMENT SINCE 1874

Refrigeration and Air Conditioning

OUR BUSINESS IS IMPROVING YOUR BUSINESS



Two 125 horsepower Century wound rotor motors driving high speed turbine compressors.



Century 100 horsepower wound rotor motor driving a refrigeration compressor.

Century 75 and 30 horsepower wound rotor motors driving a bending roll.

Century wound rotor motor.

HERE ARE

4 WAYS

TO TAKE ADVANTAGE OF THE

FLEXIBLE POWER OF

Century

WOUND ROTOR MOTORS

Meet Load Characteristics for:

1. *Adjustable varying speeds control variable process and other load conditions.*
2. *Reversing direction of operation of heavy loads — as in lift bridges.*
3. *Syncro-speed, multiple drives used where two or more operations must be coordinated.*
4. *High starting torque with low starting current — such as reciprocating compressors, steel plate bending rolls, etc.*

Century wound rotor motors are built in sizes up to 400 horsepower and are available in open protected and splash proof frames. In addition, Century builds a complete line of AC and DC motors in sizes from 1/6 to 400 horsepower for all popular requirements.

Specify Century motors for all your electric power needs.

ALTERNATING CURRENT MOTORS

POLYPHASE
Squirrel Cage Induction—
1/6 to 400 H.P.
Wound Rotor Motors—
1 to 400 H.P.
Synchronous Motors—
20 to 150 H.P.

SINGLE PHASE
Split Phase Induction—
1/6, 1/4, 1/3 H.P.
Capacitor—1/6 to 20 H.P.
Repulsion Start, Brush Lifting, Induction—1/2 to 20 H.P.

DIRECT CURRENT MOTORS
1/6 to 300 H.P.

GENERATORS
AC, .63 to 250 KVA
DC, .75 to 200 KW

MOTOR GENERATOR SETS
AC to DC, AC to AC
DC to DC, DC to AC

Open Protected, Splash Proof, Totally Enclosed Fan Cooled, Explosion Proof.

Ball Bearing motors are factory lubricated for several years' normal service. Bearing housing construction permits easy re-lubrication when unusual service demands it.

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Century C MOTORS

Any Speed YOU NEED

WITH

GEARMOTOR

. . . because it is available in single, double or triple reductions, offering a range of speeds: 780 through 7.5 r.p.m. Motor rating from 1 h.p. through 60 h.p.—A-c or D-c. The motors and gear units are each self-contained and readily separated . . . gears in multi-reduction units may be inspected, without uncoupling from driven machine.

These small, compact, self-contained units simplify the direct application of electric drive to individual machines.

GearMotoR conforms to the recommended standards of the American Gear Manufacturers Association and the National Electrical Manufacturers Association.

Send for 42-page illustrated catalog, containing full information and data necessary for ordering, and please use your Business Letterhead when requesting same.

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Good to Taste – Good to Eat!

DPi Distilled Vitamin A Esters, concentrated from natural fish liver oils by high vacuum molecular stills, do not affect the delicate, natural flavor of margarine. Your product has no "fishy" taste or odor, when batch-fortified with this extremely bland form of vitamin A.

Then, too, DPi's unique molecular distillation process concentrates natural antioxidants along with the vitamin A. They protect your label claims for vitamin A potency all through the shelf storage period you must expect for profitable distribution.

Cost? DPi Vitamin A Concentrates, with all their big advantages, are sold at competitive market-going prices.

They're available in a full range of potencies from 50,000 U.S.P. Units per gram—packed in bulk containers or handy 400-gram Myvapack* Vitamin A Concentrate cans, premeasured to your own concentration specifications. Write or call for samples and prices.

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HIGH VACUUM RESEARCH AND ENGINEERING

For OUT-SIDING...IN-SIDING...and CEILING, too

K&M *"Century"* APAC filled the bill

The total bill for the job was held down by the K&M APAC Asbestos-Cement sheets used for all walls and the ceiling of this serviceable structure. And no bill for APAC maintenance is ever even likely. The same sort of economy goes with K&M APAC on any project. Enclosure is quicker because APAC sections—large, strong, but not bulky—are easy to handle. Permanence is as certain as it can be made by a material that defies weather and fire, rust and rot, rodents and termites.

The K&M APAC Asbestos-Cement formula gives you a tough, attractive, money-saving material for panels, partitions, sheathing, shaft casings, bins—all flat areas. Apply APAC over insulation board, wood studs, solid wood sheathing, steel or wood girts. You don't even need to paint APAC! Standard thicknesses: $\frac{3}{16}''$—$\frac{1}{4}''$—$\frac{3}{8}''$... Standard sheet size—easy to cut on the job—is 4′ x 8′. For name of your nearest distributor, and all particulars, write to us.

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K&M best in asbestos

Designed and constructed by Unistrut Corporation, Wayne, Michigan.
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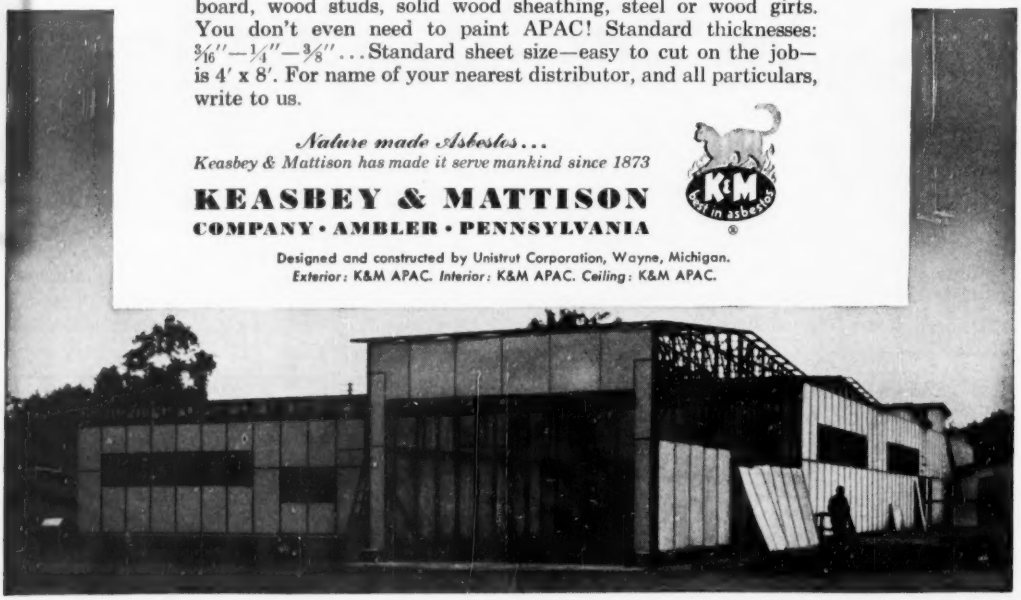
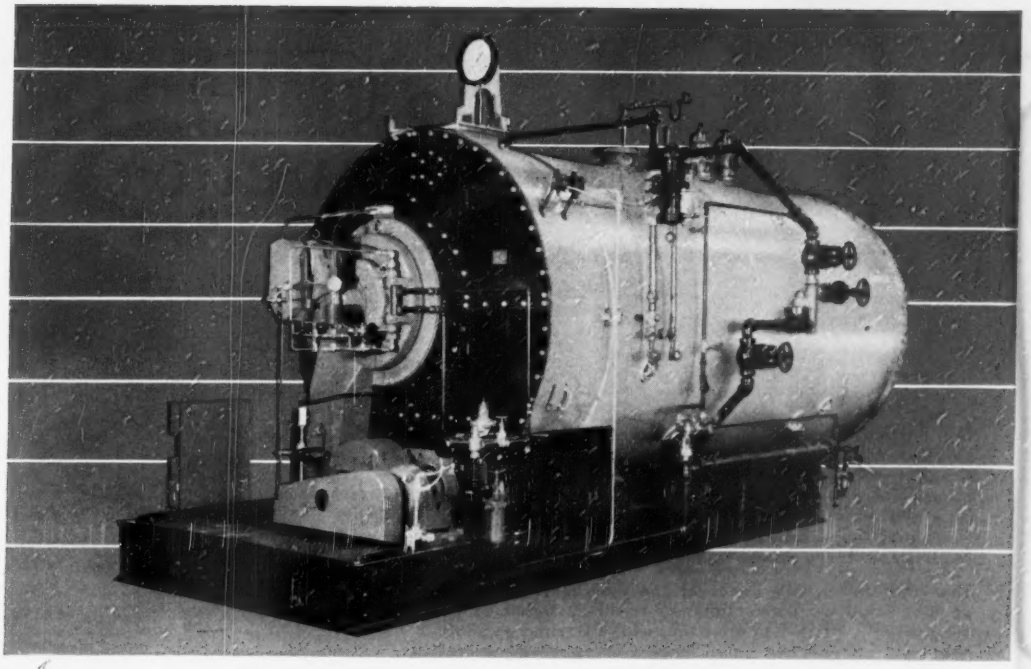


A NATION-WIDE NETWORK OF FACTORY-AUTHORIZED SERVICE

. . . Another Reason Why You Get A Greater Return From Your Investment In A Cleaver-Brooks Steam Boiler



Nothing is more important than dependable operation of your steam boiler — vital to such operation is proper maintenance and service.

Cleaver-Brooks steam boiler service facilities are national — through factory-trained and authorized service organizations. Service begins with starting of your new boiler. It is placed in operation and fully tested under load by Cleaver-Brooks service-representatives. Your operators are trained in operation, care and maintenance.

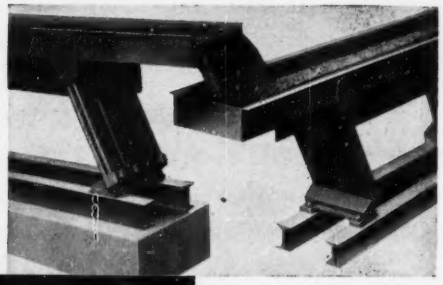
Burn the available fuel in your area — gas or oil — with equal efficiency: Through their high heat transfer Cleaver-Brooks boilers operate at a guaranteed efficiency of 80% from full load down to 30% of rating, burning gas, oil, or combination gas and oil. No high or costly stacks (a simple roof vent carries off combustion gases)—no special foundations needed. Fit low head-room areas — provide quick steaming, flexible operation to meet fluctuating loads — eliminate ash handling. Cleaver-Brooks boilers fully meet all codes — available in sizes 15 to 500 H.P. — 15 to 200 P.S.I. Write for new, just published catalog.

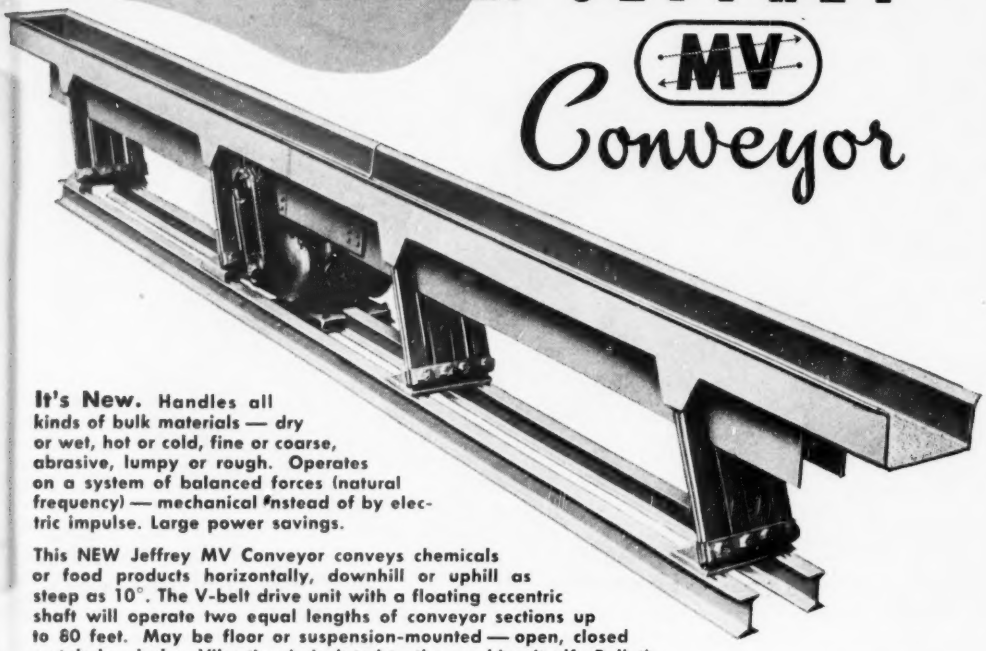
CLEAVER-BROOKS COMPANY
327 East Keefe Avenue, Milwaukee 12, Wisconsin

NEW —*The Cleaver-Brooks steam boiler Catalog—interesting—informative—beautifully illustrated. Write—on your business letterhead for your copy.*

Cleaver-Brooks
STEAM BOILERS

Handle Bulk Materials by Mechanical VIBRATION with the JEFFREY MV Conveyor





It's New. Handles all kinds of bulk materials — dry or wet, hot or cold, fine or coarse, abrasive, lumpy or rough. Operates on a system of balanced forces (natural frequency) — mechanical instead of by electric impulse. Large power savings.

This NEW Jeffrey MV Conveyor conveys chemicals or food products horizontally, downhill or uphill as steep as 10°. The V-belt drive unit with a floating eccentric shaft will operate two equal lengths of conveyor sections up to 80 feet. May be floor or suspension-mounted — open, closed or tubular decks. Vibration is isolated to the machine itself. Bulletin No. 826 goes into detail.

(Patent Pending)

THE JEFFREY MANUFACTURING COMPANY Established 1877

927 North Fourth St., Columbus 16, Ohio

Complete Line of Material Handling, Processing and Mining Equipment

Baltimore 2	Chicago 1	Detroit 13	Jacksonville 2	Pittsburgh 22
Birmingham 3	Cincinnati 2	Harlan	Milwaukee 2	St. Louis 1
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Buffalo 2	Denver 2	Huntington 19	Philadelphia 3	Scranton 3

Jeffrey Mfg. Co., Ltd., Head Office & Works: Montreal

5 to 2

people preferred his corned beef hash WITH AC'CENT!

ANOTHER REMARKABLE DISCOVERY BY A MANUFACTURER WHO THOUGHT HE COULDN'T IMPROVE HIS PRODUCT

"We doubt that there is any practical way to improve the flavor of our corned beef hash," said a prominent food packer. Yet he agreed to a test run in which a bit of Ac'cent was added in the processing of his product.

A sample of the test batch and a sample of his regular run were sent to 171 families.

With the 592 individuals who stated a preference, the hash *with* Ac'cent was preferred 5 to 2!

The result of this test, on file in our offices, is another of the many proofs that Ac'cent is a discovery that merits investigation by every processor of food. For never before has it been possible to heighten the flavor of food by so simple, so inexpensive an additive.

AT NO OBLIGATION TO YOU, we will welcome the opportunity to demonstrate what Ac'cent can do *in one of your own foods*. Following that demonstration, if a consumer test is considered desirable, we will pay the cost of it, including payment for the materials used! Wire or phone for full information.

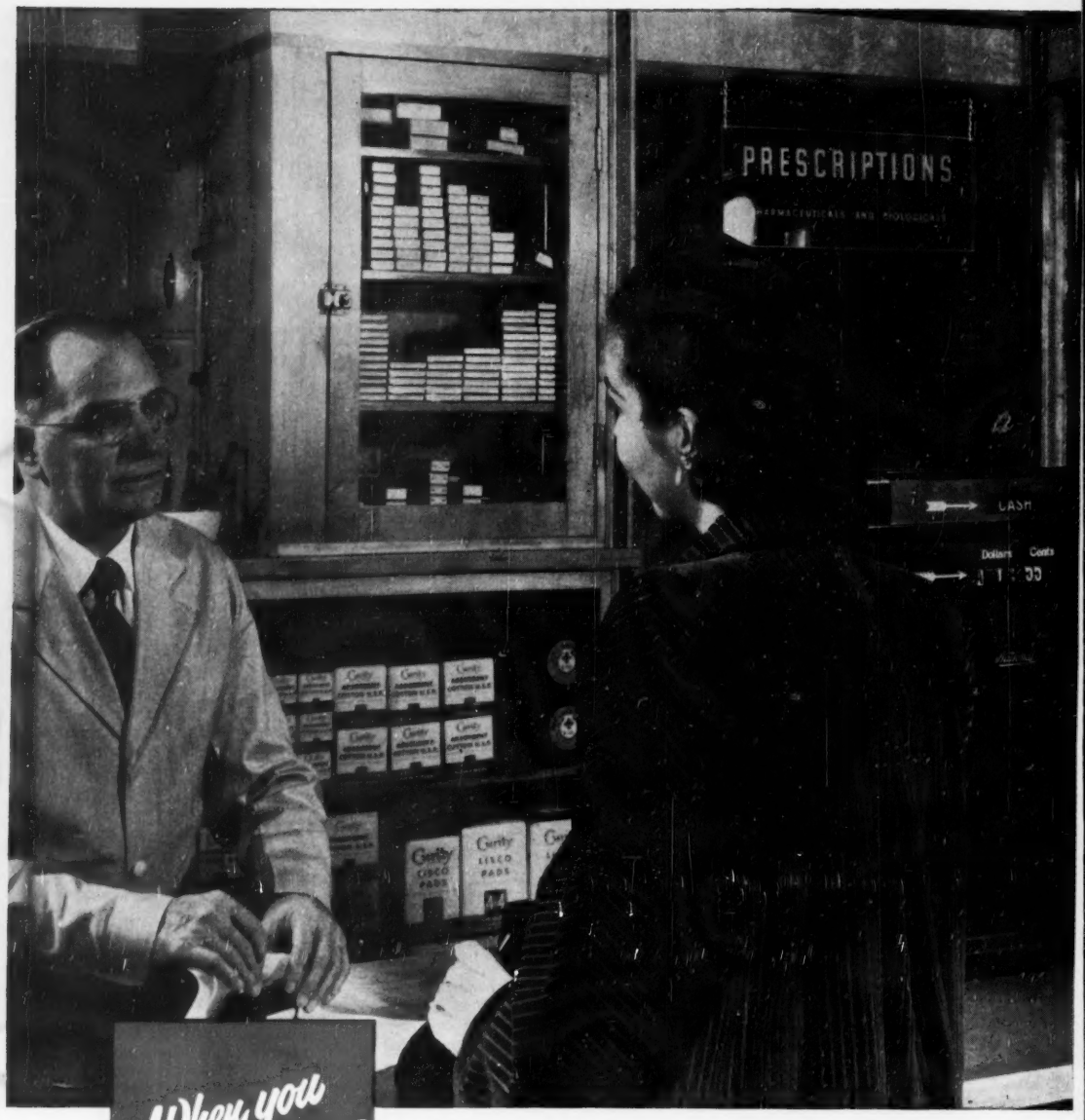
Amino Products Division
International Minerals & Chemical Corporation
General Offices: 20 N. Wacker Drive, Chicago
San Francisco: 214 Front Street
New York City: 61 Broadway

Ac'cent is not a flavoring, not a condiment. It adds no flavor, aroma or color of its own. It brings out—and holds—the *natural* flavors of foods. With Ac'cent, you use your own formulas: prepare as usual—just add Ac'cent.

Ac'cent is a 99+% pure monosodium glutamate, a wholesome vegetable derivative. 100 and 200 lb. drums.

Trade Mark "Ac'cent" Reg. U. S. Pat. Off.

Ac'cent®
makes food flavors sing♪

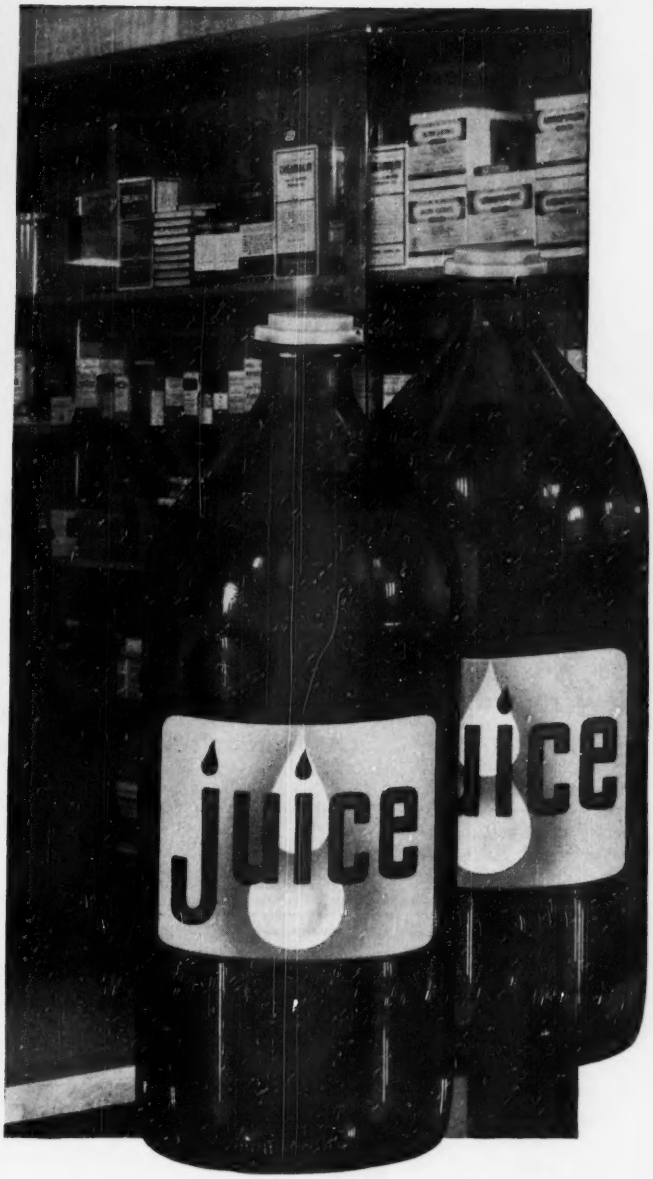


When you want the BEST go to the BEST

And for Packaging it's GLASS

The transparent glass package displays your products with all their colorful eye and appetite appeal. Inert, it does not change their taste or aroma, will not rust, corrode or leak. Easy to open, easy to use, easy to reseal to protect unused portions, it makes the most convenient package. It lends itself to individuality in size and shape, hence is adaptable to any product. Preferred by consumers because it is sanitary and convenient . . . by retailers because of its sales and merchandising advantages.

Anchor Hocking Glass Corporation, Lancaster, Ohio.



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STANDARD JUICE BOTTLES

They're ideal containers for all kinds of juices . . . prune, grape, apple, tomato or whatever, as well as for syrups, sauces and salad oils. In fact they were especially designed for them. Moreover they're economical, tough and durable containers. They're the result of practical engineered designs, consistency in manufacture, uniform distribution of glass, accurate temperature control in annealing, quality control through laboratory tests and regular inspections. *Anchorglass* Standard Juice Bottles are supplied in 10 capacities from 4 to 105 ounces, in emerald green, amber and crystal glass. But regardless of what you pack, there are *Anchorglass* containers in styles, capacities and colors that will completely meet your requirements.

ANCHORVAC*

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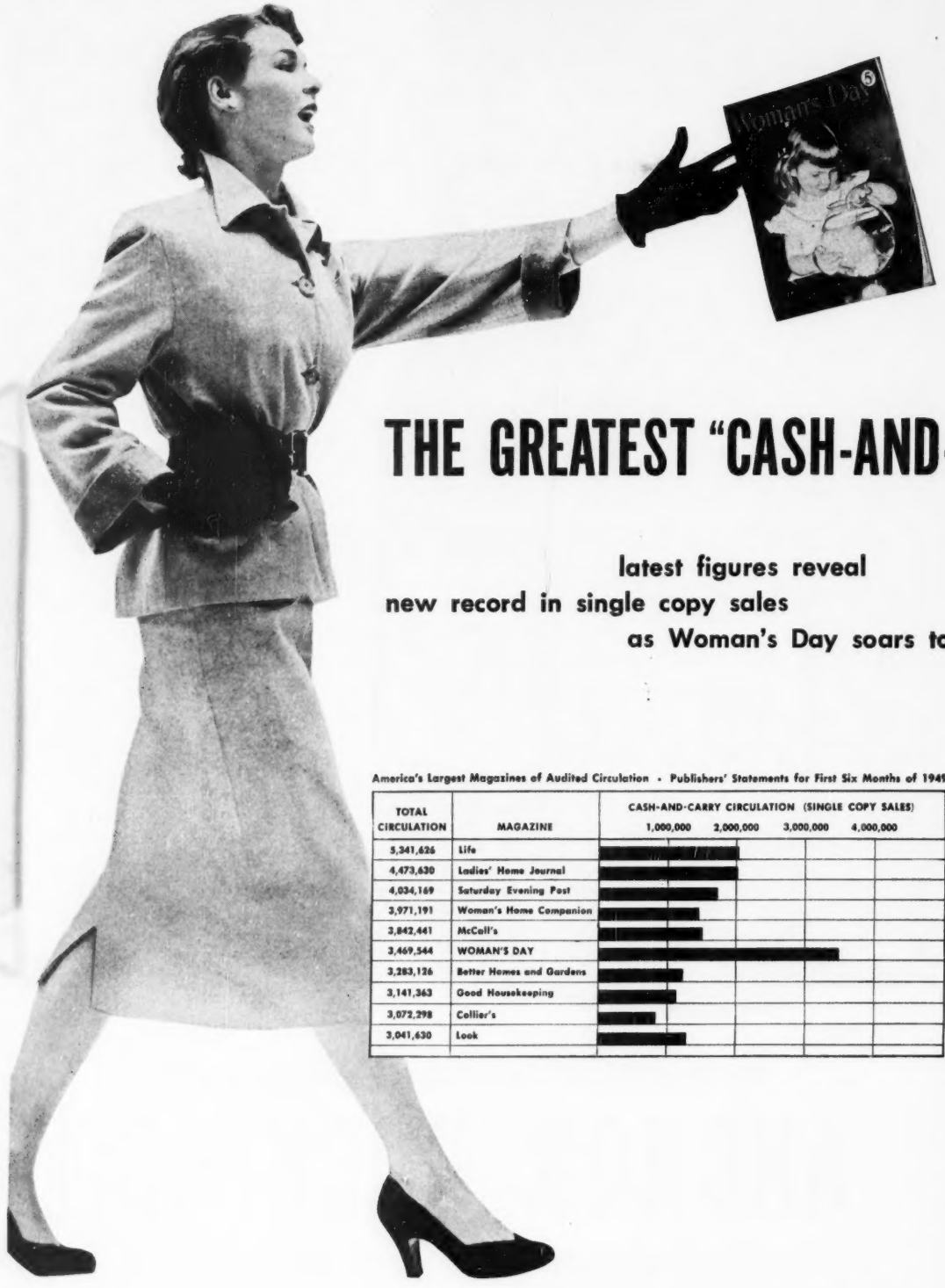
You'll like the dependable high vacuum seal and high blow-off features of *Anchorvac* N Juice Caps. You'll like their ease and speed of application—75 to 200 per minute with the *Anchor* Steriseal Machine. Housewives like the cap because it is so easily removed, because it forms a fully hermetic seal when pressed back on. If you pack or contemplate hot-packing juices, vinegars, syrups or wines with or without pasteurization, let us tell you more about the advantages and economies of *Anchorvac* N Caps, the *Anchor* Steriseal Machine and *Anchorglass* Juice Bottles.

*Reg. U. S. Pat. Off.

For the BEST in Glass Packaging *it's*

ANCHOR HOCKING

PACK IN "Anchorglass"... SEAL WITH "Anchor Caps"



THE GREATEST "CASH-AND-

latest figures reveal new record in single copy sales as Woman's Day soars to

America's Largest Magazines of Audited Circulation • Publishers' Statements for First Six Months of 1949

TOTAL CIRCULATION	MAGAZINE	CASH-AND-CARRY CIRCULATION (SINGLE COPY SALES) 1,000,000 2,000,000 3,000,000 4,000,000
5,341,626	Life	
4,473,630	Ladies' Home Journal	
4,034,169	Saturday Evening Post	
3,971,191	Woman's Home Companion	
3,842,441	McCall's	
3,469,544	WOMAN'S DAY	
3,283,126	Better Homes and Gardens	
3,141,363	Good Housekeeping	
3,072,298	Collier's	
3,041,630	Look	

CARRY CIRCULATION" OF ALL MAGAZINES

new heights

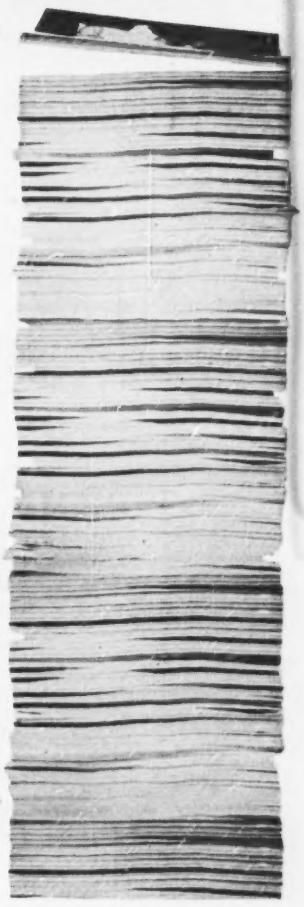
Single copy sales are the cream of magazine circulation because they are buyer-initiated. No premiums or pressures, no "song-and-dance," no special inducements bring these sales in. The single copy sale reflects the reader's desire to buy, rather than the publisher's desire to sell.

WHAT DO WE MEAN BY "CASH"? Cash is ready money . . . money the shopper is ready and able to spend to satisfy her immediate needs. Cash is what makes a woman say in one breath, "I want it" and in the next, "I've got it."

WHAT DO WE MEAN BY "CARRY"? Carry means on the go, out in the market. It is circulation that's decidedly not dead, sick, moved, disinterested, or too busy to read. Single copy customers are not only up and around. They're eager to buy . . . and that goes for products too.

"CASH-AND-CARRY"... YOUR MOST VALUABLE CIRCULATION. Cash-and-carry magazine sales represent "live" money from "live" customers . . . the richest potential for your product. The entire circulation of Woman's Day is made up of these sales . . . and Woman's Day tops all the other leading magazines in "cash-and-carry circulation."

With the December 1949 issue, Woman's Day hit a new high of over 3,830,000 — the largest single copy sale of any audited magazine in the world. And the picture for 1950 is healthy. First quarter figures show an 8.4% increase in linage and a 13.6% increase in revenue . . . the greatest number of editorial pages, the greatest number of advertising pages ever bought in Woman's Day history.



Woman's Day

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J. H. Crones, President

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Without cost or obligation, please have a Ritchie representative call on me with full details of your Free Carton Appraisal Offer.

FREE BROCHURE I would like to receive a copy of your brochure, "101 Ways to Get Better Packaging" and am interested in getting quotations on ☐ Set-Up Boxes ☐ Fibre Cans ☐ Transparent Boxes ☐ Folding Boxes. Please have a Ritchie Representative call on me.

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Company Name_____

Street Address_____

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Jewel Tea Co., Inc.
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Crane Company
The Albert Dickinson Comp
Eastman Kodak Comp
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Wixon Spic
Burch Biscuit Co.
Sunbeam Corporation
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The Toy Tinkers, Inc.
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Van Cleef Bros., Inc.
Walgreen Company
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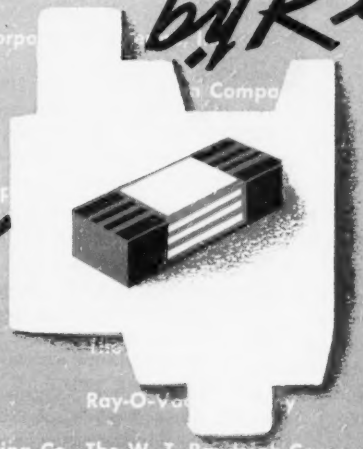
Western Printing
& Lithographing Co.



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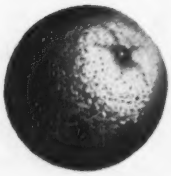
FROM  TO IN 6 MINUTES

What's the hottest thing in the food business today? That's right . . . frozen fruit juice concentrate.

At the Anaheim, California, plant of Real Gold Citrus Products Company, there's an unusual high-vacuum, low-temperature concentrator at work. This Carrier-Howard unit for making frozen orange juice concentrate is the first of its kind in the industry.

The juice enters the unit at room temperature. It passes through three heat exchangers becoming colder and more concentrated as it goes. The excess water vaporizes at this low temperature like vapor rising from the surface of a lake on a cold day.

Heart of the unit is the Carrier Centrifugal Refrigerating Machine. It supplies the heat for driving off the vapors and the cold to absorb the vapors in this vacuum low-temperature process. The condenser water furnishes the heat for the first vaporizing effect and these cool vapors furnish heat for each succeeding effect—all to reduce operating costs. Chilled water from the Carrier Centrifugal Refrigerating Machine condenses these vapors in a barometric condenser.

The Carrier Centrifugal Refrigerating Machine employs safe refrigerants, needs no housing or expensive concrete foundations. It has only one moving part and is so dependable that many units have operated for over 15 years without a major overhaul. This kind of dependability is important when you're processing something as perishable as fruit. We think that's one reason Real Gold Citrus Products Company believe that Carrier is their best investment. For help in your industrial refrigeration problem, regardless of temperature or size, call on Carrier.

Carrier Corporation, Syracuse 1, New York

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Plenty of power—and dependable power—to handle heavy loads at lowest cost! Two great engines bring you new power, new stamina, new and spectacular performance with economy. These 1950 Chevrolet P•L trucks are the most powerful trucks Chevrolet has ever built.

In performance, popularity, payload and price, Chevrolet is the outstanding leader! Chevrolet is the nation's choice for every trucking job . . . and on each job, these P•L trucks have established their right to leadership by years of outstanding service.

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Far ahead with all these PLus *Features:*

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The public's overwhelming preference for Chevrolet is proof of owner satisfaction earned through the years. Beyond question, Chevrolet P•L trucks are the nation's leading choice in the entire truck field.

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The new Chevrolet P•L trucks give you high pulling power over a wide range of usable road speeds—and on the straightaway, high acceleration to cut down total trip time.

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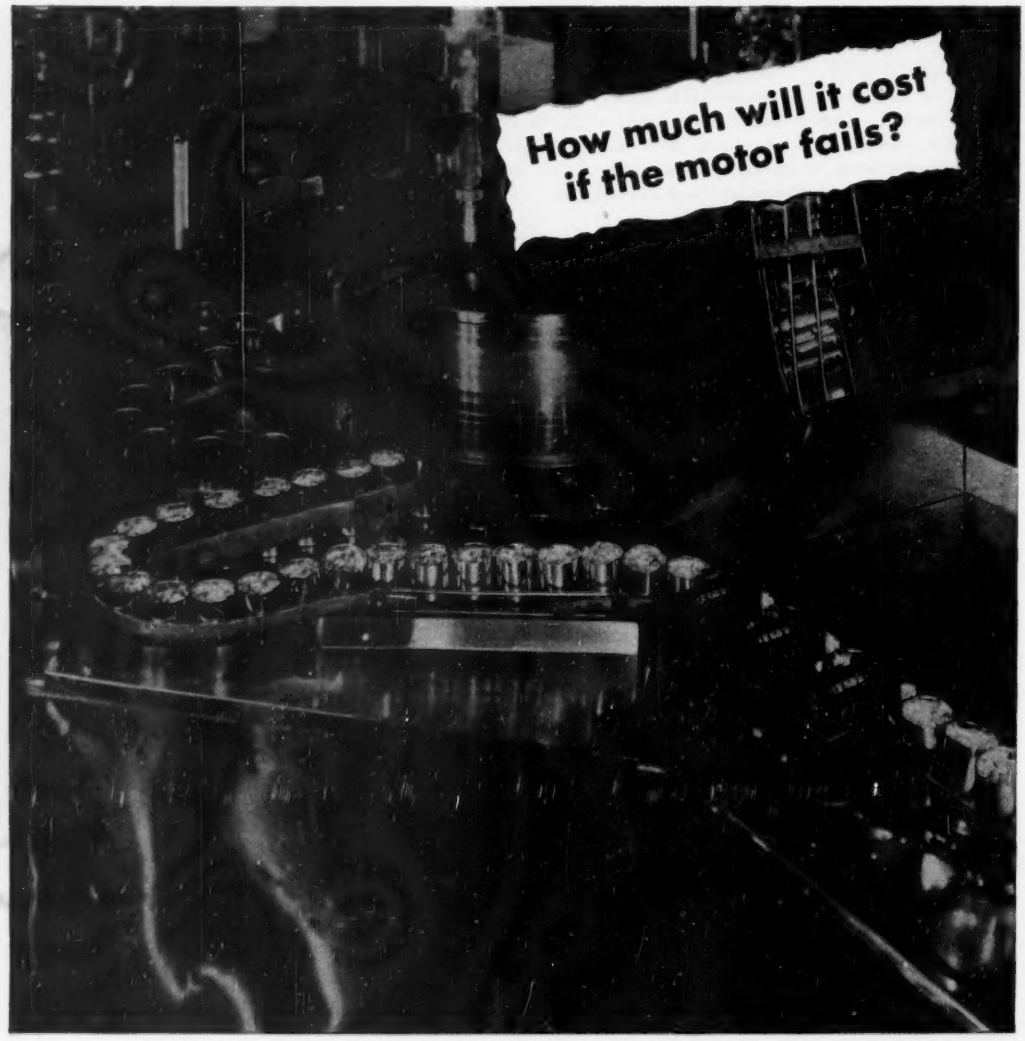
P*rice L*eaders From low selling price to high resale value, you're money ahead with Chevrolet trucks. Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—and high trade-in value—all add up to the lowest price for you.

CHEVROLET

YOU CAN BE **SURE**.. IF IT'S
Westinghouse



HERE'S THOUGHT FOR FOOD

When a production line goes down in a food plant—costs skyrocket. Spoilages alone can add up to a $1000 an hour. And the down time may all be caused by one motor outage. Isn't that food for thought?

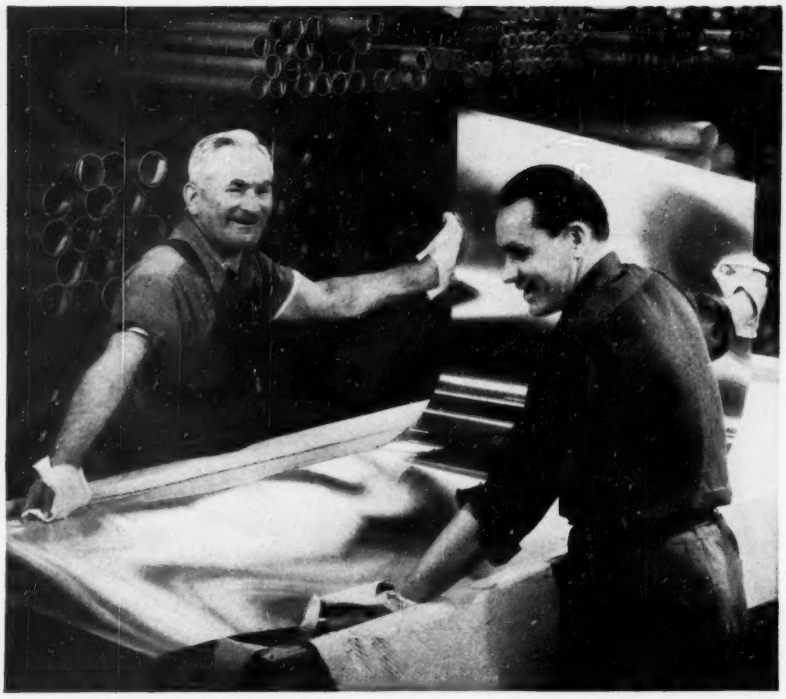
Take just a minute, then, to consider what a Life-Line can mean to your production line. Its extra "Life" features have the stamina to keep your equipment operating even under adverse conditions.

For example: Life-Line's heavy all-steel frames, brackets and feet, guard against physical shocks . . . against accidental blows. Pre-lubricated bearings eliminate faulty lubrication . . . save the time and cost of constant greasing attention. Stator windings—of Tufvar wire, extra-protected by multiple dips and bakes in Thermoset varnish—cut outages from oil, moisture, dirt and heat. In fact, records of nearly half a million Life-Line motors show an on-the-job performance—twice as good as the best motor built by Westinghouse in 58 years. That's a record of performance that is hard to beat—one that will certainly pay off on your production line.

And, important too, is the fact that Life-Line motors offer a complete line. Dripproof, splashproof, totally-enclosed, fan-cooled and sanitary motors that meet 3-A specifications. Ask your Westinghouse representative for a presentation of the sound movie, "What Price Motors" and booklets B-4321 and B-3842, or write Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-21562

If you figure LIFE COSTS . . . you'll figure LIFE-LINE



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You save three ways when you use Ryerson service on stainless steel.

1 **You save inventory expense** because Ryerson maintains large stainless stocks that you can consider your own inventory reserve.

2 **You save time** because these stocks are available at thirteen plants, strategically located from coast to coast, and Ryerson ships promptly.

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It's safe to keep your own stainless inventory at a practical working level because convenient Ryerson stocks include most all types and finishes in practically every shape and size.

Allegheny stainless bars, angles, plates, sheets, tubing, pipe and fittings are all on hand for quick shipment. And since Ryerson also carries large stocks of carbon and alloy steel, you can save time and reduce paper work by concentrating your steel purchases with one convenient source. So get in touch with our nearest plant for every kind of steel.

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TUBING—Seamless & welded mechanical & boiler tubes
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RYERSON STEEL

MARCH, 1950

Food Industries

A Challenge to Equipment Builders and Users

There have been encouraging improvements in food plant equipment, as was evident at the recent baking and canning machinery shows. But there still exist in the food processing industry a challenge and a big opportunity for equipment manufacturers.

There is need for acceleration in the rate at which more efficient and sanitary equipment is developed. And there are many possibilities for adapting existing machines to new uses.

This need to speed progress also challenges executives, engineers, technologists and production men in food plants. They should study and define their requirements in respect to better equipment. Then they could call these to the attention of equipment builders and cooperate in developing new and improved machines.

Food plant men also should keep abreast of advanced methods and equipment in all branches of the industry. If they do, they often will find more or less ready-made answers to some of their problems.

If equipment manufacturers and food plant men both apply their ingenuity, the quality of foods can be improved and processing costs lowered, with great benefit to the industry. And the equipment man will profit handsomely if he comes up with something so good that processors cannot afford to be without it.

Some food processors have been accused of resisting change, taking the attitude that new developments were invented to bedevil them. Many equipment manufacturers have been criticized by progressive food processors for not improving their machines faster. And it is not unusual to see side by side in a food plant a 20-year old piece of equipment and a new model which are almost identical.

Let us consider some specific examples of the adaptation of equipment to new uses. The continuous short-time high-temperature pasteurizer has been borrowed from the dairy industry to solve problems for canners, preservers and beverage manufacturers. A new continuous mixer was first used to make marshmallow, but now is mixing cake batter. An efficient machine which will heat, cool, mix or aerate resembles a continuous ice cream freezer and is being used to process cake batter, marshmallow, eclair filling, salad dressing, baby foods, and other products. A spray-type bottled-beer pasteurizer recently has found applications in the preserving and freezing industries. Precise dairy-type control instruments now are improving quality and cutting costs in many branches of the food industry. These examples are typical of what can be done.

Now there are special opportunities for companies with extensive engineering know-how. They might, for instance, study heat-balance problems. Then they could show the industry how to utilize steam more efficiently. It often is possible to cut costs by passing steam through a turbine driving a generator, blower or compressor, and then use the steam at reduced pressure for process heat.

Some equipment companies, we are happy to relate, are aware of the opportunities. One large firm recently inaugurated a study of food processes to find where its present equipment will fit and to learn what new things it can develop for the field. Other firms have thoroughly studied instrument requirements. These have contributed importantly to progress and have obtained a lot of new business.

Equipment manufacturers who help to accelerate progress in food processing will be well rewarded. The industry is one of the biggest, it is stable, it is certain of steady growth, and it spends better than half a billion dollars a year for new plant and equipment.

Food plant executives, engineers, technologists and production men who cooperate in such progress will be leaders in the field.

—F. K. LAWLER, *Editor*

QMC Asks Industry Aid

Cooperation of food producers is essential if the Quartermaster is to find improved rations to meet problem-studded demands of our national defense

LT. COL. JOSEPH S. KUJAWSKI
Commanding Officer, Q. M. Food & Container Institute For the Armed Forces, Chicago.

You in industry who make, and we of the Armed Forces who use, the materials and stores required in military operations know all too well the hard truth of George Washington's historic remark: "In time of peace prepare for war."

But the perennial question that we both face is *how* to prepare. For preparedness means knowing what to prepare *for* and how far it is practical to go. Peacetime preparations sometimes miss the mark, for the unassailable reason that predicting the needs of the future *exactly* is not humanly possible.

Yet few will dispute the value of attempting to anticipate our problems and of itemizing, in the light of known needs, the specific obstacles that stand in the way of solutions. That is precisely what my associates and I are undertaking to do with regard to the food and container problems for the Armed Forces. These problems are not "dreamed up." They stem from specific analysis of subsistence needs made by technical people and by observers in the field.

The accomplishment of our ultimate purpose—better rations—will be distinctly aided by directly bringing to FOOD INDUSTRIES' large audience the details of what the armed forces require from the industry and why.

In introducing this series of articles on the key food and container problems of the armed forces, it will be useful to look briefly into the background. Knowledge of the basis and general nature of military subsistence problems and attendant container problems should aid not only in understanding their relative urgency, but also in appreciating anew our need for industrial cooperation in solving them. If, in this opening article, I can also acquaint you with some of the new rations or ration components in which the armed forces need improvement to fulfill our current conceptions of what military feeding should be, then the articles to come can center at once on the technical or technological aspects of the specific ration and container problems that confront us. My object, in short, is to provide a framework of reference for the series of articles to follow.

Background Provides the Perspective

Almost before the echoes from Pearl Harbor had died away, the Quartermaster Corps was deep in the problem of how to get the fundamental food and container needs of the armed forces before industry. Col. Rohland Isker, then commanding the Subsistence Research & Development Laboratory of the Quartermaster (now the Quartermaster Food & Container Institute for the Armed Forces), took to the road immediately to put before industrial, university, and military groups and individuals the crucial problems faced by the Quartermaster Corps. These problems had pertained not only to procuring foods and containers, but also to the development of foods and containers suited to the immediate needs and, insofar as possible, to the foreseeable military feeding requirements of World War II.

Then subsequently, in articles in various journals, including FOOD INDUSTRIES, Colonel Isker, Dr. Jesse White, Col. Paul Logan, Major Clarke, and other laboratory personnel, hammered home the facts about some of the key deficiencies of ration components as demonstrated by wartime experience. And this spontaneous information program was so effective during World War II that a similar one, even though less urgent, appears to be warranted in these present troubled days.

Source and Nature of Problems

The subsistence problems of World War II, as defined by Colonel Isker and his associates, emerged from three well-authenticated military necessities: (1) The pressing need to conserve

←**FOOD PACKERS** can readily appreciate the challenge inherent in developing subsistence rations for troops operating in temperatures as low as —65 deg.

BETTER CANNED RATIONS that will be suitable under diverse conditions are constantly being sought.

shipping space, (2) the frequent necessity for going beyond commercial practices in protecting foodstuffs from the hazards of handling and prolonged storage, and (3) the need for easily utilized, packaged rations of superior stability, palatibility, and nutritional value. Complicating the last two of these basic problems were the critical shortages during the period—of strategic materials such as tin, of technically trained personnel, and even of food items such as sugar, coffee and spices.

The difficulty with huge basic problems is that they are composed of innumerable little problems. Consider, for example, the conservation of shipping space. It is a basic problem in all warfare. No doubt it has dogged the Quartermaster Corps since the days of supply by wagon trains, and conceivably it can do so again. To conserve the shipping space allocated to subsistence items means reducing the weight and volume of foodstuffs by such processing methods as dehydration, concentration and compression. Changing the shape of the commercial package may also be entailed in a few instances where the commercial package is not well adapted to economical stowage.

These conservational measures force problems upon industry—problems of retooling, in some cases, and of training personnel in new technics in others. The big problem in all cases has dispersed itself into dozens of little problems. Many of them can be solved only by industrially experienced technologists. In a subsequent article we shall submit them in detail.

Other types of container problems come to light while striving to protect foods against the hazards of military supply lines and the vicissitudes of storage. With respect to packaging, for example, it is our inescapable responsibility to specify superior types of barrier materials to protect foods against their persistent enemies—moisture, heat and air. Such barriers must be sufficiently strong and durable to tolerate open storage of subsistence in swampy areas, on the burning sand, or on glacial ice. They must stand up under the jars and impacts of extreme rough handling, and it is even desirable, in view of the exigencies of war, that they withstand immersion in salt water for short periods of time. Troubles relative to the dropping of subsistence packages from airplanes comprise another problem that has not yet been suitably solved.

Even without mentioning the problems entailed in stabilizing the foodstuffs themselves against the hazards of transit and storage, it should be evident from the foregoing examples that all of the technological know-how and all of the scientific data pertinent to these problems can be utilized to bring the packaging and packing of subsistence to the point where reasonable protection against the adversities of military handling and storage can be had. But it must be emphasized that to solve the big problems, the steady solution of many small problems must precede.

Another great problem is that involving improvement of rations by increasing their shelf life, heightening their palatability and general acceptability, insuring their ready use in the field, and preserving the original nutrient content of the processed components through extended storage. It is evident that here, again, there are so many smaller problems that no one organization can possibly hope to solve them.

With respect to the general problem, the Institute has a twofold purpose: To participate in the attack on those aspects that are clearly pertinent to rations or ration components, and to bring problems that involve production methods to the attention of those engaged in industrial research and development. Industrial objectives may parallel our military ones in a considerable degree. We have your generous help of the past to warrant our assuming that, even where your problems are not benefited directly, your aid and counsel will be contributed.

Little Problems Can Become Big

Before proceeding to a schematic presentation of how our particular problems fit into our program to improve rations, I want to make one other observation: Little problems have a nasty habit of growing up into big problems. For example, the design of rations for use in areas of extreme cold was a problem of some concern in the forepart of World War II—at least during the period when we were recovering the Aleutians. But, since the centers of war were southern Asia, the South Pacific, northern Africa, and

First of a Timely Series

Some of the key problems in designing foods and containers for the armed forces are outlined in this first special article of a series being prepared by the Food & Container Institute.

In articles to come, typical problems in each of the commodity groupings will be discussed in detail.—The Editors

Packages Must "Take It"

ROUGH HANDLING of packaged items, such as carcass of beef (above), is one of problems facing packaging departments of contracting food plants.

CRATED fruits and vegetables that will be subject to army field handling and storage also need improvements that probably only the industry can find.

Europe almost from the beginning, no persistent need for rations suited to extremes of cold was evidenced. In the postwar period, however, an uneasy interest in the Arctic inspired the desire for adequate "ration preparedness" in these regions.

It is difficult to challenge the logic of this comparatively recent change of emphasis. But, as regards food and containers, the fact remains that we have a new mystery to cope with: What happens to foods and container materials subjected to temperatures ranging down to —65 deg. F.? Moreover, since summer temperatures in the Arctic rise well above freezing, data on the effect of alternate thawing and freezing on stored rations are required.

For use as a frame of reference for the special articles to come, there follows a schematic presentation of how typical problems in each of the commodity groupings relate to our general ration program. Included are references to definitive footnotes at the end of this article.

ITEM: Canned meats.

Rations involved: Ration, Operational, B[1]; Ration, Small Detachment[2]; Ration, Individual, Combat[3]; Food Packet, Individual, In-flight[4]; Food Packet, Individual, Assault[5].

Probable circumstances of use: Overseas, any regions of the world, by large groups, small combat units, or by individual combatants detached from their units.

Improvement required: Flavor, texture and variety.

Background: Prevention of the waste through rejection. Rejection has been due to undesirable "canned" flavor and mushy texture, both of which are intensified by long storage at unfavorable temperatures. Monotony results from continued use of canned meats, and for this reason the widest possible variety is desired.

ITEM: High carbohydrate food product.

Ration involved: Food Packets, Survival (Experimental)[6].

Probable circumstances of use: Abandonship and disabled aircraft situations; all situations where personnel are isolated by the fortunes of war or, for that matter, by disasters occurring during peacetime.

Improvement required: Since this is still an experimental ration component, the need is for the development of a low-moisture food, high in carbohydrate, non-thirst-provoking, non-irritating to the membranes of the mouth, sparing in expenditure of bodily water, and capable of being stored for at least 6 months at 100 deg. F.

Background: The subsistence provided victims of disaster and awaiting rescue must be dense in calories to conserve weight and space, must be sparing of bodily water since only about a pint of water daily is likely to be available, and must be capable of a storage life of at least 6 months at 100 deg. F. since storage in lifeboats, aircraft, and the like, for several months prior to use is probable.

ITEM: Orange juice.

Rations involved: Ration, Operational, B; Ration, Small Detachment; Food Packet, Individual Combat; Ration Supplements, Special Items Pack, Hospital[7]; and Special Items Pack, Aid Station[8].

Probable circumstances of use: Overseas areas, from the tropics to the Arctic, by large groups, small groups, casualties in hospitals and aid stations.

Improvement required: A dehydrated or concentrated product, capable of rapid reconstitution and possessing the flavor, color, and aroma of fresh juice and having storage life of 6 months at 100 deg. F.

Background: Because orange juice is a familiar item on the menu and an excellent carrier of vitamins, a readily utilized dehydrated or concentrated product would add immensely to the rations in which it is contained. Its usefulness for invalid feeding is too well known to require elaboration.

Thus far, I have presented the relationship of certain desired food items to the ration program. Containers are equally important in the ration set-up, as the following two typical items will show:

ITEM: Water-vaporproof barrier material.

Rations involved: At present, where packaged items such as candies, cigarettes, cereal and cocoa are included: Ration, Operational, B; Ration, Small Detachment; Ration, Individual, Combat; all Ration Supplements and all food packets. (The barrier will also be

used to protect metal repair parts for mechanical equipment.)

Probable circumstances of use: Overseas, by all personnel: Large groups, small groups, or individual combatants; in other words, all over the world, in the tropics, Arctic, and temperate zone.

Improvement required: A barrier to insure protection against moisture changes during shipping and storage at temperatures ranging from —85 deg. F. to + 165 deg. F. and over the relative humidity range.

Background: Barriers presently used have not performed adequately at —20 deg. F. to +120 deg. F. with 90 percent relative humidity. The ineffectiveness of these barrier materials in extremes of heat or cold makes the development of a superior barrier essential.

ITEM: Packing for shell eggs.

Rations involved: Ration, Operational, B; Ration, Field, A[8].

Probable circumstances of use: In both domestic and overseas areas. In overseas areas, handling is likely to be performed rapidly and by inexperienced personnel.

Improvement required: Greater protection against handling hazards by means of uniform egg sizes and better cushioning media.

Background: From 5 to 15 percent loss occurs under present handling. Since it is not feasible to set the handling of eggs apart from handling accorded other commodities, a better means of protection of the product must be devised. A notable saving can be effected by such an improvement.

With this brief survey of specific items, a basic concept as to why we desire improvement in the commodities intended for armed forces feeding may be gained. Subsequent articles will provide similar background for the remaining food and container items on our list.

■ "These problems are not 'dreamed up.' They stem from specific analyses of subsistence needs made by technical people and by observers in the field. The accomplishment of our ultimate purpose—better rations—will be distinctly aided by bringing to *Food Industries'* large audience the details of what the armed forces require from the industry and why."

Definitive Footnotes:

[1]A special-purpose field ration corresponding to the basic field ration, except that no perishable items are included. Composed of processed foods, its high stability and space-saving qualities make it the ration of choice for overseas use in either peace or war. It is fed to large groups on the basis of the Expeditionary Force menu. Well-balanced and varied meals can be prepared from the components and the supplementary spice pack that accompanies each 1,000 rations.

[2]This ration supplies food for five men for one day and is packed in a single container. The components are packaged foods of high acceptability. The ration is employed in feeding situations where men are separated into small groups for the purpose of manning armored vehicles, radar stations, bomber aircraft, anti-aircraft weapons, and the like.

[3]This ration is for individual use by troops on patrol, on outpost duty during rapid advances, and similar situations. Six rations are packed in a strong fiberboard case, each ration containing canned meat and vegetable units, canned fruits, bread units, a beverage unit, and accessory items. Enough food for one man for a 24-hr. period is provided.

[4]This packet is for use by passengers or crews of aircraft during flights extending over two or three meal periods. Included are meat unit, a fruit unit, a bread and a dessert unit, providing a total of 1,200 calories.

[5]This lightweight combat food packet is for use where operational conditions prevent planned resupply and where military personnel must carry its own food for an indefinite period of time. Canned meats and vegetables, confections, soluble coffee, and accessory items such as cigarettes are provided. Duration of use is limited to three days, since the packets do not constitute a complete meal nor do three or more packets equal a ration (enough food to provide for one man for one full day).

[6]These packets are in the experimental stage. At present they are designed to sustain survivors of land, sea or air disasters for a period of ten days. The desired attributes are: An optimum proportion of fats, carbohydrates and protein; minimum thirst-provoking characteristics; adaptability to specific environments, such as the tropics or the Arctic; high stability, palatability, and utility.

[7]This ration supplement is intended to provide stimulating beverages and quick energy foods for hospitalized personnel. It supplements the basic hospital ration, particularly in areas where supply is limited to processed foods.

[8]This supplement is for use by combat zone casualties who are being cleared through aid stations. The means for preparing hot stimulating beverages is provided. Certain accessory items are also included.

[9]This ration, used for large group feeding, contains perishable foods. Adequate refrigeration is required.

Initial photo in this article: U. S. Marine Corps; other photos: U. S. Signal Corps.

Armed Forces Food and Container Problems

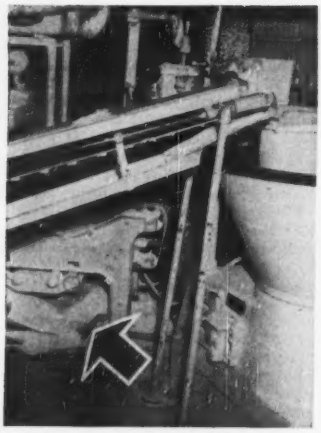
Some Desired Characteristics of Rations and Components

Functional Design		Adequate Nutritive and Caloric Properties	Best Attainable Acceptability to Assure Adequate Intake	Extended Stability	
Foods	Containers			Foods	Containers
Ease and rapidity of preparation	Readiness of issue	Sufficient amounts of vitamins and other nutrilites	Optimum color, odor, texture, flavor	Canned, dehydrated, frozen, cured, and otherwise processed foods that retain their acceptability and nutritive properties through extended storage	Adequate packaging and packing design to protect against handling and storing hazards
Versatility of use	Ease of handling and storing	Best attainment of body reserves	Adaptation of rations to food preferences of Americans of military age		
In-field edibility					
Hot or cold					
	Ease of carrying on person (individual rations)	Attainment of best composition of rations to optimum metabolism	Sufficient variety to prevent monotony of diet and resulting waste		Barrier materials resistant to damage by heat, air moisture, flavor transfer and other spoilage factors
	Ease of opening				

Some Obstacles to Overcome

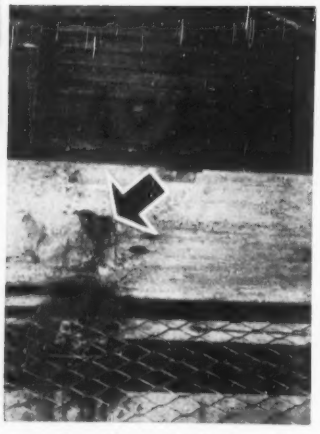
Limitations of space and weight imposed by shortage of shipping and/or storage facilities		Difficulty of reconciling opposing needs, e. g. adequate nutritive properties and limited size of food packet as in survival feeding	Adversities of military supply lines and storage, resulting in food deterioration	Natural instability of foods and food constituents under processing and storage conditions	Extreme climatic conditions encountered in supplying and storing rations for use in remote areas of the world
Limitations due to food characteristics and manufacturing facilities.		Limitations of space and weight	Inadequate and faulty preparation for consumption		Handling hazards of military supply lines
		Limited stability of nutrilites			

They'll breed—



in spillage under equipment

also in lift-pit trash



and wall cracks invite them

Here's a Sure-Fire Guide For Spotting Plant Pests

Adoption of this "can't miss" scouting technic will enable you to bar the bugs from your bakery—or whatever kind of food plant you may operate

J. V. BLANKMEYER
Industrial Sanitation Counselors, Louisville, Ky.

PART I

Few, if any, bakers today would lay claim to having *100 percent* freedom from insects or rodents in their plants. For these invaders must always be reckoned with.

Despite constant vigilance, they may enter by means of contaminated flour, new paper stock, returned cartons, open doors, and the like. You may be sure that somewhere in your plant evidence of either insects or rodents, or both, can be found if you really look for them.

Numerous articles have been published describing the control of these pests, proper sprays, setting of traps, advisability of using poisons, and the pros and cons of fumigation.

■ **No. 1 step in any control program is to locate the infestation. Unless you know the sources and treat all of them, re-infestation is inevitable.**

The purpose of this two-part article is to help a baker find all these places in his plant. No matter how conscientious, he may be, he seldom investigates all the possible harborages and breeding places. Too frequently the approach is casual, the baker feeling that "a trip now and then through the plant" is sufficient to make sure everything is all right.

"Then if I find there has been some neglect," he says, "I see that it is rectified."

But—the entire picture can change in a few days.

Problems we will discuss here are not limited to any one branch of the food industry. They are general, and the inspection technics outlined are applicable, with but few modifications, in any food operation.

So let us tour through a typical plant—a bakery producing bread, cakes and sweet goods—and look for evidence. Although your own plant layout may not be exactly like this one, the similarity will be sufficient for you to adopt the suggestions.

What's Needed for Inspections

We shall make use of a simple inspection form—one which can be passed on to the department foreman for action and then returned to management for follow-up purposes. Immediate follow-up is most important for eradicating infestation before it has time to mushroom and reach other areas.

But, before you make an inspection, here's the equipment you will need:

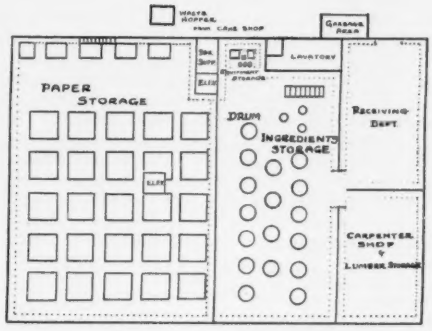
1. Good flashlight, preferably a 3-cell light that can be focused to a small point.
2. Pocket or small putty knife and a long-handled spoon for probing in cracks and corners of equipment.
3. Small sprayer containing a chemical activator and repellant spray.
4. Pocket magnifying glass.
5. Several small bottles for collecting insects. (Samples should be taken where any infestation is uncovered.)
6. Small sieve of 40-mesh screen (or smaller). And an electric agitator is helpful, if available.
7. A portable black-light outfit for locating evidence of rodent urine can be helpful, but it is not necessary. If ultra violet light is considered for special spotting purposes, some knowledge of the substances fluorescing under black light is necessary to make proper use of this tool.

General Inspection Principles

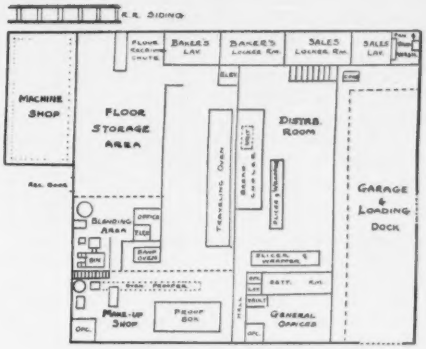
Though it may make little difference where we start the inspection, it is important that a time be selected when all the equipment is shut down, in order to permit a thorough inspection. Most suitable period, of course, is during the week end clean-up.

A few general inspection principles will apply to all areas in the bakery, including offices and lavatories. Windows and screens should be checked to make sure they have no holes

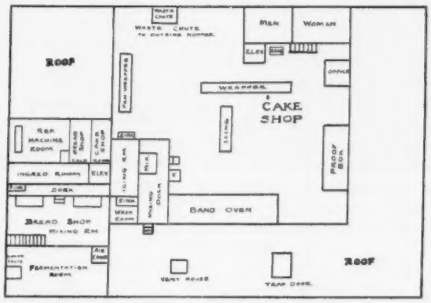
Chart of Your Own Layout Makes a Practical "Bug-Battle" Map



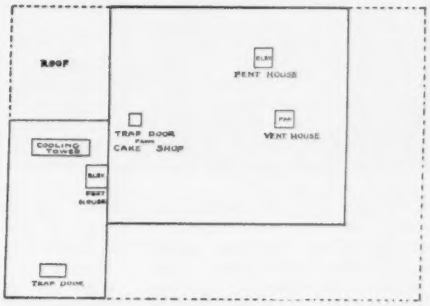
BASEMENT FLOOR



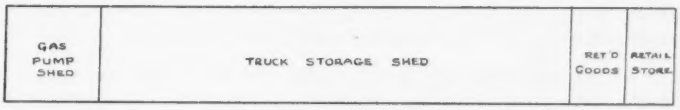
FIRST FLOOR



SECOND FLOOR



TOP ROOF AREA



OUTSIDE AREAS

Infestation can occur in every area depicted in this plan of a typical bakery.

Draft a similar "blueprint" of your own plant and use it for strategic and tactical checking of your anti-pest progress.

through which insects or rodents may enter. And don't overlook the skylights, since they present a similar problem. Open windows and doors should be screened wherever possible. Doors opening to the outside should be checked to make sure that they are rodent-proof.

Note baseboards and moldings throughout the plant. They should receive particular attention in areas where dry sweeping is employed. Scrape residue from behind baseboards and moldings with the putty knife and examine it. Many bakeries use bread crumbs as a sweeping compound. These are inevitably swept into cracks and behind loose molding, thus furnishing food for insects. In one plant, heavy infestation was found in the crack between a wooden floor and a concrete hallway. This crack was covered by a steel plate.

Holes and cracks in walls and floors

should be examined, since they offer excellent breeding places. In checking cracks and holes, spray them with the activator. If bugs are present, the spray will drive them into the open.

Make sure that all floor drains are equipped with grilles. All ledges, switch boxes, light fixtures, and various upper surfaces, as of pipes and ducts—in short, anywhere that flour may collect—are potential insect breeding places that should not be overlooked. Holes in lagging on pipes afford excellent habitations for insects and rodents.

Examine Dead Air Spaces

False ceilings with dead spaces above them are frequently infested, particularly where their cleaning has been neglected. In fact, one of the largest collections of roaches ever encountered during a bakery inspection was in a dead air space above the president's office.

Roaches often inhabit the sanitation supply room, since they are attracted by wet mops and dirty sinks. A soiled-rag container will also draw roaches. Check behind cartons or drums, and look at the inventory items on the shelves, in the bins, and in the corners. Examine the powdered hand soap carefully for flour beetles, especially if the soap has a corn-meal base.

An examination of the elevator pit, cab, and shaft may reveal insect or rodent infestation. Scouting around cracks or holes inside elevator pits, an inspector may discover a roach or rodent nest.

Don't miss the ventilators and fans. Often, flour is drawn into them. And despite the air flow, bugs may harbor under an accumulation of flour. Watch for fan openings that lack screens, thus permitting entry of rodents.

Put lavatories and locker rooms on your list. They get attention by federal inspectors. Areas under lockers may contain litter and bread crusts which attract pests. If possible, the lockers themselves should be inspected. Such things as remnants of employees' lunches may invite roaches.

Many industrial firms have scheduled locker inspections (either semi-monthly or monthly) carried out by a responsible representative of management. Usually, unions favor this practice, since it protects the employees' health and belongings. Receptacles for soiled uniforms should be especially noted, for they often attract roaches.

If the locker room contains a soft-drink vending machine, look carefully for roaches that are lured by spillage or by soda pop left in bottles.

Spaces around showers often will reveal mold growth, particularly if they are not well ventilated. Rim areas of toilets and urinals should come in for a special check. Here, a pocket mirror is helpful for looking underneath. Condition of supplies—soap, towels, and toilet tissue—is usually to be noted in passing, since they affect the morale of all employees.

Offices are not immune to infestation. Storage cabinets, files, vaults and paper cartons can harbor insects or rodents.

White Line Packs Punch

All progressive bakeries employ the "white line"—a 12 to 18-in. strip painted at the periphery of the floor and extending 8 in. up the wall—to facilitate location and eradication of an infestation. This line is coated with a residual spray, such as 5 percent DDT or 2 percent chlordane.

Inspection of any area begins with the white line, where evidence of insects or rodents—dead insects, rodent pellets, or possibly the characteristic dark rodent-runway smudge along the wall—will be readily apparent.

Look Into Storage Rooms

Storage areas require a constant watching and careful handling if they are to be free from infestation. In the plant depicted in the floor plan on our opening page, almost the entire basement is used to store cartons, paper goods and drummed ingredients—in short, everything except flour and sugar or those materials requiring refrigeration.

Management in this typical plant is progressive. Practically everything is stored off the floor on standard flour skids. Sufficient aisle space remains between rows of skids and drums. And nothing is placed closer than 18 in. to the wall. The white line is also employed.

In inspecting such storage areas, check closely under the skids. Watch for spillage of ingredients. If present, it frequently may reveal insect tracks or rodent pellets. Inventory items on the skids may also furnish evidence of infestation.

If old machinery is stored in the basement, there is a good chance of its being infested, particularly if it was not cleaned thoroughly before it was stored. Rodent pellets, roaches and beetles are often found in it.

Old lumber piles or stacks of pipes also make excellent habitations for rodents and insects. Don't overlook such accumulations, and do not pass up any stored material covered by a tarpaulin. Paper storage areas also offer harborage for pests. Roaches and mice are often brought into the plant with new paper goods and in knocked-down cartons returned by the bakery's customers or distributors.

Ingredient-storage cabinets and closets also present likely breeding places, because spices, sugar, shortening and poppy seeds—unless kept in covered containers—spill in the cabinet and attract insects. Some bakers have solved this problem by using stainless steel containers with hinged non-removable tops. These containers are mounted on a movable frame.

Cold rooms cause difficulties, particularly in the cake shop, because of the yeast, raisins, frozen eggs, shortening, jelly and syrups stored in them. Watch for spillage, since spilled ingredients quickly draw insects and rodents. Check for molds on the walls, pipes, floors, refrigeration unit and condensate pans. In the refrigeration room, check the pumps and motors. And do not overlook the bases of these units which often afford harborage.

Check Flour Shipments

Inspection of the flour-storage area is a painstaking job. Each shipment of flour should be gone over. White line areas in this department deserve special consideration. Second only to the basement storage area already mentioned, pests are more likely to inhabit this area than any other, for flour sacks furnish excellent breeding places.

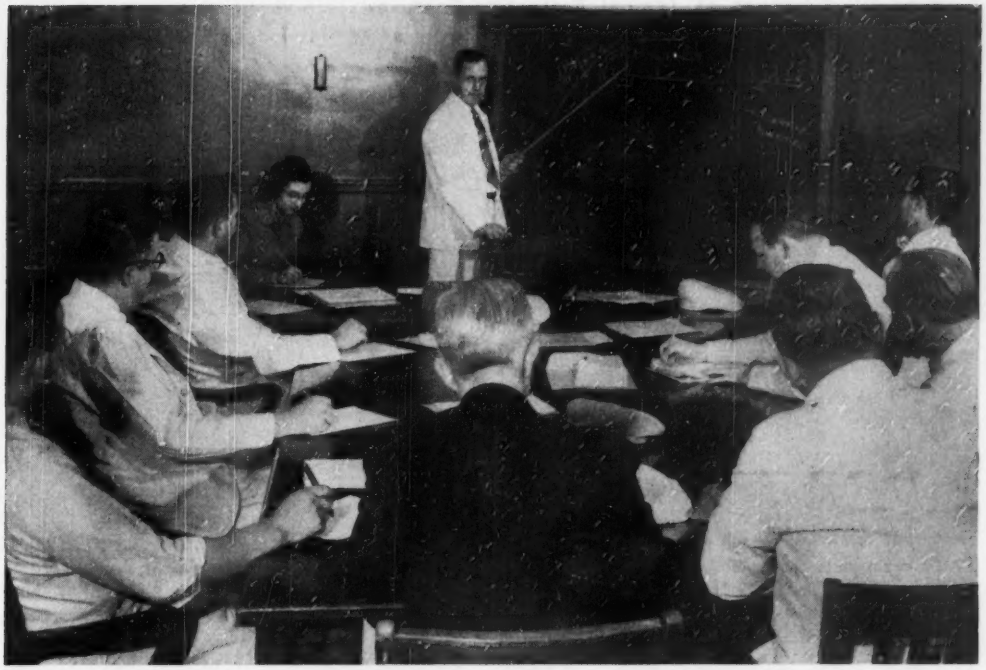
Be sure to examine the ears and seams of the sacks, particularly if they are cloth. Watch for holes in the sacks and places where spillage has occurred. Look at the tops of skids for rodent tracks and pellets. Paper sacks covered with flour show tracks easily. It is much more difficult to detect them on cloth sacks, unless the flour dust is very heavy. Pellets, however, readily cling to cloth sacks.

The receiving chute in the flour-storage area is often neglected. Beneath many of these chutes is a dead space or recess where flour collects. The chute door, like other outside doors, should be rodent-proofed so that it does not furnish entry for rats or mice.

Ingredient storage areas, where special flour and other ingredients are piled on skids, are to be examined in the same manner as the regular flour-storage area—from top to bottom.

The pan-washing room attracts roaches because temperature and moist atmosphere are ideal for them. Areas beneath and behind the pan-washing tank or machine and rack washer furnish excellent hiding places for these insects. Molds are also common here.

Specific details on how to make thorough infestation inspections of your plant equipment—such as blenders, mixers, make-up units, ovens, and wrappers, in this bakery example—will be presented in the concluding Part II of this article to be published in a subsequent issues of FOOD INDUSTRIES.



PRIME POINTS in assuring personnel protection in labeling operation are demonstrated on blackboard at meeting of Supervisory Safety Committee. Group is made up of factory supervisors. Each man takes turn as chairman.

Big Profits for Everybody—In Safety

Heinz proves it by running a "non-stop, watch everything" accident prevention program that's tumbled the mishap rate of its plants down to an all-time low

OUTSTANDING employee safety records have been achieved in H. J. Heinz Co. factories and sales branches from coast to coast—the rewards of carrying on a constant, finely detailed accident prevention program.

In fact, this food processing firm rates high up the safety scale among all the companies in the industry. Operating 10 major plants and 81 sales branches in the U.S., this organization has established an overall accident frequency of only 7.3 for 1949. This figure, just computed as this article was prepared, is but a third of the average frequency rate of 20.4 reported by the National Safety Council for the entire food industry during 1948.

Highlighting the company's safety performance is the new all-time record established in 1949 by the Pittsburgh plant. Here, a total of 1,316,833 man-hours free of lost-time accidents were worked from June 21 to October 7.

This accomplishment not only topped the entire canning and preserving industry, but broke this plant's own mark set in 1940. At that time, a world's record of 1,182,906 accident-free man-hours was established over a period of 130 calendar days.

As the largest of all the Heinz factories, the Pittsburgh plant offers a concrete example of how the safety program was initially developed and the various steps taken to attain continuing improvement.

Here, the program was organized on a full-time basis in 1934. A factory safety director was appointed whose only company duties were to properly train employees to work safely, to eliminate possible safety hazards, and to thus reduce the number of accidents. The safety director is an expert on accident prevention and he works very closely with the National Safety Council.

In 1936, this factory had a total of 50 lost-time accidents, with a plant frequency of 11.1. Frequency is figured on the national basis of lost-time accidents per million man-hours of exposure.

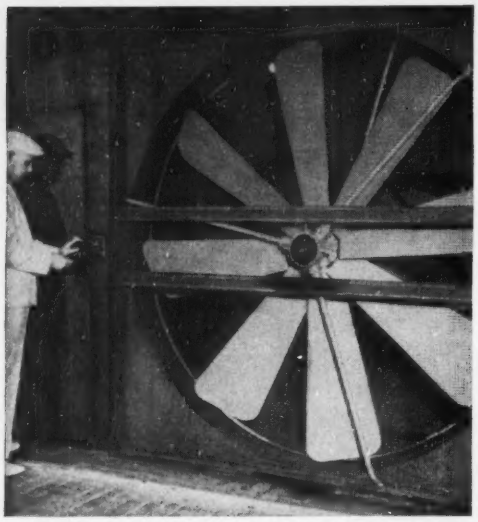
■ **By 1948, the accident frequency was reduced by more than 50 percent, while man-hours worked increased 10 percent! In fact the 1948 plant frequency was down to 5.37, with a total of only 28 lost-time accidents.**

All Heinz factories in 1949 improved their lost-time accident frequency rates on an average of 40 percent over 1948.

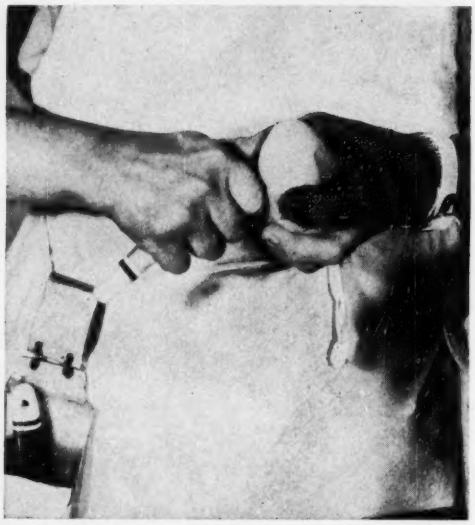
Morale Booster

Company spokesmen point out that constant attention to factory and

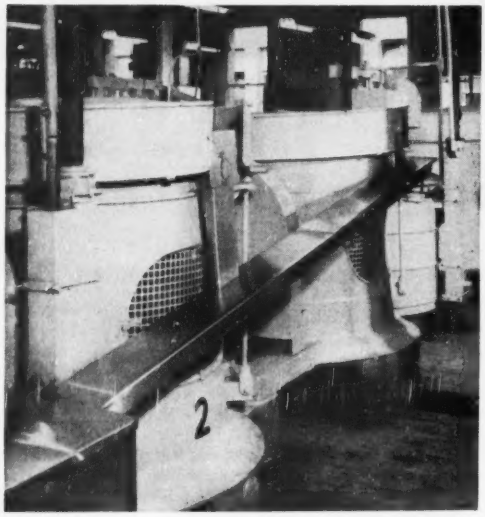
Camera-Eye Closeups of Typical Protective Features



FAN in dry room is micro-switched off when door is opened, thus protecting workmen when he steps in.



METAL-MESH glove protects hands of women vegetable trimmers. Sanitary aluminum sheath holds cutting knives.



MUSTARD MILLS show latest safety features—hoods and screens guarding all drives and bite points.

GIRL at automatic cap press machine is fully protected by grill over dies, screen over flywheel.

sales branch safety, with the workers participating directly in the efforts to reduce accidents, has resulted in improved employee morale. This "dividend" is in addition to the sharp reduction in the number of injuries.

The Pittsburgh plant's program is a pattern for all company factory safety programs. Here, there is a factory safety staff of eight members, including the factory manager. Each member serves, in turn, as chairman of the factory supervisory safety committee for a six month period. And about 10 percent of the factory department heads serve on the safety committee. Membership is rotated every six months so that the entire factory supervisory force serves on the committee.

It is the safety supervisor's duty, assisted by the committee, to prepare the safety program and factory safety policy and then present it to the factory staff for final approval. The agenda of this and all safety committees consists of films, suggestions, inspections, new equipment, safe practices, and safe procedures.

All new employees attend a special induction program in which safety rules and practices are highlighted by a safety lecture and a slide-sound safety film.

The overall company safety program is directed by the Personnel

Division of the company's home office in Pittsburgh. And through the Safety & Employee Development Department there is supervised the vast national program throughout branch factories and sales branches.

Records Across the Country

Indicative of the success of the program at the firm's 10 major factories are the following accident-frequency-rate standings compiled for 1949: Muscatine, Iowa, 1.53; Chambersburg, Pa., 1.98; Holland, Mich., 2.87; Bowling Green, Ohio, 3.57; Fremont, Ohio, 3.94; Salem, N. J., 4.88; Medina, N. Y., 5.05; Pittsburgh, 7.30; Tracy, Calif., 12.61; and Berkeley, Calif., 20.6.

Saginaw, Mich., a principal receiving station and salting house, compiled a perfect record for the year.

Moreover, on Sept. 9, 1949, the Bowling Green, Ohio, factory completed a 12-month period without a lost-time accident. The Medina, N. Y., plant was awarded a "Certificate of Merit" from a mutual insurance company for having established a record of 539,041 man-hours worked without a lost-time accident.

Four of the firm's factories established perfect safety records of no lost-time accidents during one four-month period in 1949. In July, all factories turned in perfect, no-lost-time records.

Salem, N. J., is another Heinz factory with a consistently high safety score. In 1948, this facility received the bronze safety award of the National Safety Council for placing first in its class in the Food Section Safety Contest. Later in the same year, this plant established a two-month perfect safety record and won the leadership of its section in the South Jersey Safety Council contest.

The Muscatine factory has established a record of more than one year's perfect performance—a total of 650,000 man-hours worked without a lost-time mishap.

Fleet Program

There are 255 delivery truck drivers in the entire company fleet. These men are all covered by the company's "Fleet Safety Program." Last year 96 of these men established perfect driving records. Perfect records for 19 yr. had been chalked up by two of the men, and five others had perfect 18-yr. records.

This fleet program is administered from the home office in the Safety & Employee Development Department of the Personnel Division. The program is channeled through the manager of each sales branch and the personnel manager of each factory. At the sales branch, the safety program is directly administered by the office manager through the shippers.

National Safety Council literature, and other safety material, are given to each driver periodically. Occasionally, the Safety & Employee Development Department distributes this literature to the branches along with a safe-driver letter of its own, plus other additional features.

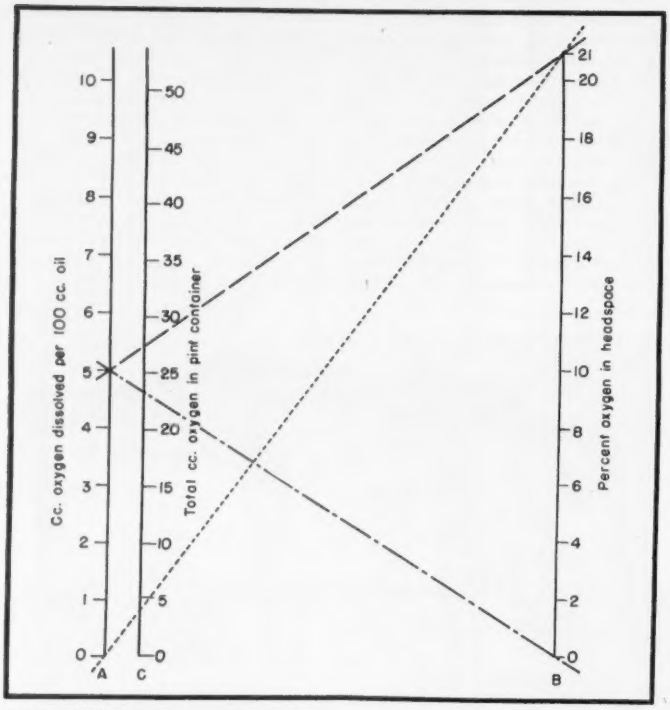
The fleets are entered in the National Safety Council Fleet Contests by regions. Eight regions regularly vie with each other for honors in this national contest. *The 57 News*, Heinz employees' publication, runs regular monthly standings of both factories and fleets. Thus, the various plants also compete among themselves.

Used, too, is the National Safety Council Individual Driver Award System. The awards consist of lapel, cap, or keychain emblems, in addition to a wallet certificate. The emblems vary in value, depending upon the number of years of safe driving which they represent.

The employees' own safety tips—how to improve the safety program by accident prevention—are handled through the company's suggestion system.

11 Safety Steps That Pay Dividends at Heinz

1. **EVERY FILLING LINE** is enclosed with shining, stainless steel enclosures. These guard all chains, sprockets, and other possible nip joints.
2. **NEWLY-MADE CANS** on way to filling department were found to be falling at junction points of overhead cable conveyor system. Perforated metal baskets now catch falling cans and protect heads of passers-by.
3. **PROTECTION** is carried out to the smallest equipment. Even the little devices used to date newly filled jars and cans of baby foods are completely covered.
4. **LABELING MACHINES** and automatic case packers, having many natural hazards due to their design, are completely guard-fitted.
5. **GOOD HOUSEKEEPING** prevails everywhere, including out-of-the-way places such as elevator penthouses on building roof tops. Company cleanliness is a "must" in preventing fires.
6. **LEAD-FUME REMOVAL** ducts are placed over all body makers in can making. Company is one of first to install this device to keep lead fumes down to less than .15 mg. per c.m. of air around equipment.
7. **A GUILLOTINE** meat cutter located in Pittsburgh plant is guarded at feed end with a long hood—long enough so no one can reach into descending knife.
8. **MEAT GRINDERS** have extended hoppers made purposely high so there can be no reaching into grinder from floor level.
9. **ALL IN-PLANT** refrigerators have non-locking safety doors, overcoats for personnel use, and axes to chop one's way out if locked in. There are also pushbuttons to operate distress bells outside refrigerators.
10. **LIGHTWEIGHT** magnesium loading plates are used to avoid strains and back injuries when these units have to be moved about the plant.
11. **SKILLED MECHANICS** regularly inspect elevators, hoists, cables, and sterilizing equipment. Resulting reports are carefully studied.



NOMOGRAPH 1. In sample problem, a pint product's known-characteristic values (5 and 21 on Axes A and B) are connected (dash line), then total oxygen content of product is read as 27.7 (on Axis C). Scribing of a headspace-purge (dash-dot line) indicates a drop in content to 23.5—but a dissolved-oxygen reduction (dotted line) is revealed to be best because it lowers content to 4.2.

Where Trim the Oxygen Content? These Nomographs Will Tell

Containers of liquid foods have oxygen in both product and headspace. To find which component is most feasibly reduced—to improve product shelf life—just put a straight-edge on the charts

E. R. FLOOK*

The Linde Air Products Co.,
Tonawanda, N. Y.

Consumer packages of edible oils, fruit juices, vitamin preparations, and numerous other liquids, can have their storage life extended materially by carefully protecting them from the effects of both dissolved and gaseous oxygen. And now, nomographs have been constructed to facilitate evaluating these effects.

In an increasing number of applications the oxygen content of a package may be reduced by purging the headspace with nitrogen prior to sealing. However, a tendency exists to overlook, or underestimate, the effect of the oxygen which may be dissolved in the product prior to packaging.

A simple method for demonstrating the relative importance of these two factors (dissolved and gaseous oxygen) is provided by the three Linde nomographs displayed here:

- **Nomograph 1**—For determining total oxygen content of pints of liquids with large dissolved oxygen content.
- **Nomograph 2**—For use with pints of liquids with small dissolved oxygen contents.
- **Nomograph 3**—Applicable with containers of sizes other than pints.

These graphs may be used to determine, under a variety of typical conditions, the total oxygen content of a closed vessel, or the quantity contributed by either the headspace gas or the liquid.

Nomograph 1 will show the total oxygen content of pint bottles filled with liquid having an exceptionally high dissolved-oxygen content, such as an edible fat and oil product. It applies accurately when the bottle contains 1 pt. of liquid and 20 cc. headspace, a distribution which approximates typical filling practice.

The total oxygen content of such a bottle can be found when the concentration of the oxygen in both the oil and the headspace gas are known. Merely place a straight edge on the graph to connect the known concentration in the oil, on Axis A, to the known concentration in the headspace gas, on Axis B. Then, the point at which the straight edge intersects Axis C indicates the total cc. of oxygen in the bottle.

Examples Show Procedure

For instance, the total oxygen content of a pint bottle filled with a liquid containing 5 cc. of oxygen per 100 cc. oil and having air (21 percent oxygen) in the headspace is found to be 27.7 cc. on Axis C by connecting 5 on Axis A to 21 on Axis B (see dash line on Nomograph 1). The result of purging the headspace to a composition of 0 percent oxygen can be found by simply moving the straight edge to connect 5 on Axis A to 0 on Axis B (dash-dot line on nomograph). Its intersection with Axis C indicates that the total oxygen content would then be reduced to 23.5 cc.

Thus 4.2 cc., or about 15 percent of the total oxygen may be removed by purging the headspace.

Moreover, the effect of reducing the oxygen content of the oil may similarly be demonstrated by connecting 0 on Axis A to 21 on Axis B (dotted line on nomograph). In this instance, it is found that the total oxygen content is reduced to only 4.2 cc. It is indicated, therefore, that in this case reduction in the dissolved-oxygen content offers the opportunity for great-

* Word of the recent death of Mr. Flook was received as this article was being prepared for the printer—Editors.

est improvement, and that headspace composition would be of secondary importance.

If the dissolved-oxygen content were reduced to 4 cc., or approximately 0.85 cc. per 100 cc. oil, then the maximum of 4.2 cc. that the headspace could contain would represent approximately 50 percent of the total. In this case, material improvement could be obtained by treating either the liquid or the headspace gas so as to reduce its oxygen content. However, if more than 50 percent improvement is desired, it will be necessary to treat both.

Since there are applications where compositions run well below 4 cc. total dissolved oxygen content per pint of oil, Nomograph 2 is brought into play. This graph is similar to Nomograph 1, except that it is calibrated over a more limited range of dissolved-oxygen values and therefore gives much greater accuracy in this range. Here, an added scale—Axis D—shows the total oxygen content of a pint bottle containing only 10 cc. headspace. Like Nomograph 1, this chart applies only to pint bottles, and it is used in identical manner. Since there is a fourth axis, however, care should be exercised in selecting the correct axis on which to find the answer.

This graph may be used to demonstrate the effect of variation in headspace size by assuming typical values for the variables concerned. For example, a processor may fill a liquid containing 0.4 cc. oxygen per 100 cc. oil into pint bottles and seal them at a headspace composition of 4 percent oxygen. Now, if the headspace volume is 20 cc. the total oxygen content (Axis C) is 2.7 cc. (see dash line on Nomograph 2). Of this, 1.9 cc., or 70 percent, is in solution in the oil.

Reduction of the headspace volume to 10 cc. would reduce the total oxygen to 2.3 cc. (as shown where dash line intersects Axis D). In this case, 1.9 cc. or 83 percent of the total, is contained in the oil, and only 17 percent is contributed by the headspace gas.

It is obvious that, in either of these cases, further reduction in the headspace oxygen concentration would produce only very limited improvement, and that reduction in the headspace volume further accentuates the importance of the dissolved oxygen content.

It is highly probable that occasions will arise when it will be desirable to consider the relative importance of dissolved and headspace oxygen in containers of sizes other than pints. For use in such applications, Nomograph 3 has been constructed. Similarly to the other two, this graph has Axes A and B calibrated in terms of concentrations of dissolved and headspace oxygen. But in addition, it has four intermediate axes indicating the total oxygen at various relative headspace values. Total oxygen is indicated on these four axes as cc. oxygen per 100 cc. of liquid in the container.

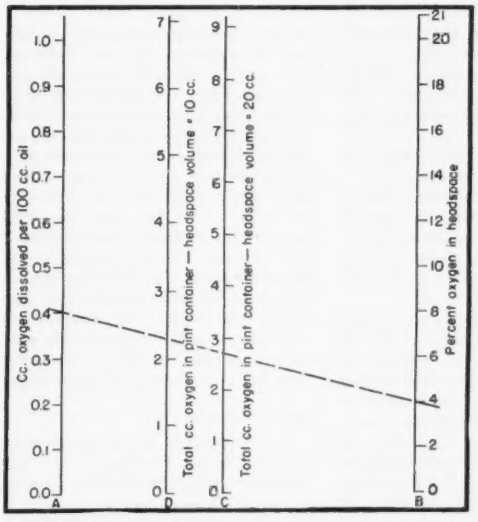
Any Size Can be Calculated

As an example of the type of problem which may be solved by use of this nomograph, the oxygen content of a pint bottle filled with liquid containing 0.4 cc. oxygen per 100 cc. oil and sealed with a headspace composition of 4 percent oxygen may be found. A pint is 473 cc. If the headspace volume is 20 cc., then this is $20/493 \times 100 = 4.0$ percent of the container volume.

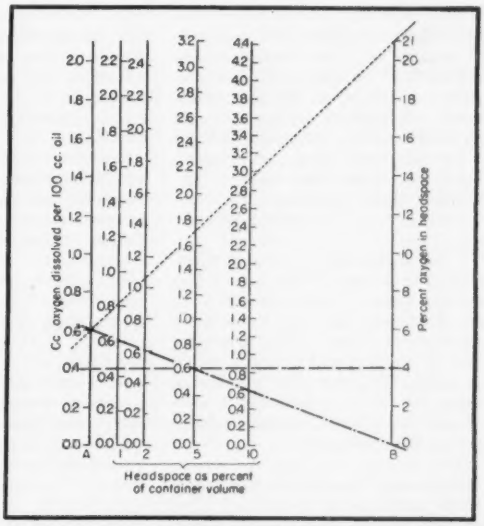
The best scale on which to find the answer is, therefore, the one marked 5 percent. A straight edge connecting 0.4 on Axis A and 4 on Axis B intersects the 5-percent line (see dash line on Nomograph 3) at 0.61 cc. oxygen per 100 cc. of liquid. Accordingly, the total oxygen in the container is $0.61 \times 474/100 = 2.9$ cc. This agrees reasonably well with the figure 2.6 we obtained earlier by reference to Nomograph 2, the discrepancy being caused by the fact that the actual headspace does not correspond exactly to that for which the scale is calibrated.

In another application on Nomograph 3, it might be desirable to in-

(*Turn to page* 180)


Cc. oxygen dissolved per 100 cc. oil
Total cc. oxygen in pint container — headspace volume = 10 cc.
Total cc. oxygen in pint container — headspace volume = 20 cc.
Percent oxygen in headspace
A
D
C
B

NOMOGRAPH 2. Here, scaling is for pints having small dissolved oxygen content. Problem (dash line) shows specific sample to have 2.7 total oxygen content when headspace is 20 cc. (read on Axis C) or 2.3 when headspace is 10 cc. (Axis D). Again, best results would be obtained by reducing dissolved oxygen—for it's quickly seen, without need for further scribing, that a headspace purge would provide very little cut-back.



NOMOGRAPH 3. This one, having four columns representing 1, 2, 5, and 10 percent headspace volume, is for use with varying size containers. If problem is with pint product (dash line), 5 scale is used, for 20 cc. headspace. Answer is 0.61. Another problem (dotted line) is for a gallon container. Here, answer on 10 is 2.95, and it is seen (dash-dot line) that a headspace purge would give an 0.6 reading—an 80 percent improvement.

Water chlorinated here . . .

OPERATOR sets Wallace & Tiernan unit to give water required chlorine residuals for processing and cleaning.

. . . sanitizes fish on conveyors

CHLORINE-TREATED WATER, piped to unloading dock, washes incoming fish as they are conveyed into the plant.

Break-Point Sanitation Boosts Fish Quality

Method effectively—and economically—reduces bacteria count on fish and equipment, curbs objectionable plant slime and odors

TAKING A CUE from vegetable canners and frozen food packers, Gorton-Pew Fisheries Co., Ltd., recently installed an in-plant break-point chlorination system in its Gloucester, Mass., plant—to find out if it really would do a more efficient, more economical water-treating job, effecting better sanitation.

Two short words told the story: It did.

In fact, the economy was a revelation. For it was quickly learned that the new system required only 12 to 15 lb. of chlorine per day to maintain residuals of 5 ppm. while processing and 25 to 30 ppm. during clean-up periods. With the price of chlorine about 10c. a lb., this ran to a mere $1.20-$1.50 a day to maintain chlorine beyond the break-point.

But economy was just the starter. The clincher was that the new sterile water carrying the bactericidal agent greatly reduced slime and other contamination factors throughout the plant, and as a result there was a definite lowering of bacteria counts on the fish. What's more, the objectionable fish-plant odors were minimized.

To brief the approach to the problem, first step is, of course, sterilization of the water. However, that doesn't hit the target hard enough. Something else is needed—a bactericidal agent in this sterile water. And this is supplied in break-point chlorination.

Water treated by this method requires the addition of sufficient chlorine to produce and maintain free residual chlorine to the exclusion, or near exclusion, of combined residual chlorine (chloramines). Break-point chlorination is different from marginal chlorination, where little attention is given to the type of residual or its persistency. Chlorine residuals will kill practically all types of bacteria in water within a few minutes, whereas equivalent amounts of chloramine residuals may require 1½ hr. or more.

Delivered to cutting tables, fish not washed with germicidal water may be covered with millions of fish-spoilage-type bacteria. Accordingly, fillets cut from such fish can contain large numbers of bacteria. But, by washing incoming fish, also the equipment and floors, with water containing free chlorine, fish will have less bacteria and their keeping qualities will be improved.

A survey made during the early months of the installation of the system revealed that in-plant chlorination does the job with notable success.

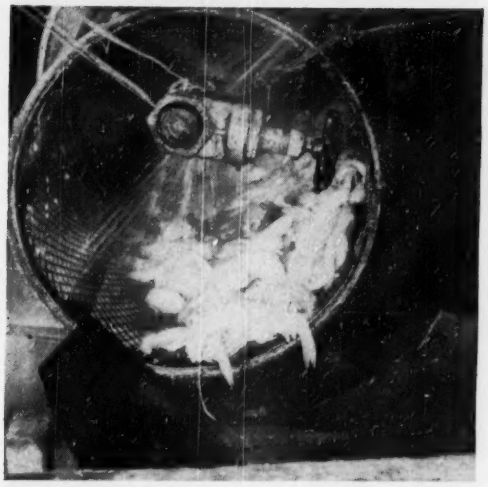
In conducting this check, a series of bacteriological examinations was made. Ten sampling points (see table) were selected throughout the fillet-processing line at the Gorton plant. Samples were taken about every two weeks, and at the same time of day, from these stations. Six separate examinations of each of the ten samples were made during a two-month period, after residuals of 5 ppm. of free chlorine were provided. And results were extremely encouraging. First, bacteria counts were lower than those recorded at these stations prior to break-point chlorination.

New vs. Old

For a re-check on the effectiveness of break-point chlorination, it was necessary to find out what the bacterial counts would be at these stations using the old marginal chlorination system, in which chlorine residuals were 0.1 to 0.2 ppm. Again, six sets of samples from the ten stations were taken over a two-month period.

As was expected, marginal chlorination was not as effective as break-point chlorination. Tests showed that bac-

. . . and in scalers



SPRAYS inside rotary scaler play chlorinated water on fish to continue the job of killing bacteria.

. . . also keeps work-tables clean

RUBBER-BELT (left) carrying fish to cutters is washed with chlorine water. Hose (right) contains treated water.

teria counts increased at all of the sampling points. Counts were as much as 600 times greater than the number found at the first sampling during the break-point chlorination cycle.

These results indicate that there is not enough chlorine introduced into the water by marginal chlorination to react with all the organic matter. In short, the combined (chloro-organic) residuals have considerably less bactericidal action than free chlorine. Only by introducing suffieient chlorine through break-point chlorination will the chlorine demand of all organic matter be satisfied—with additional provision of the free chlorine necessary to do the more effective bacteria-killing job.

Convinced that the 5-ppm. free residual chlorine kept the bacteria count lower than when smaller residuals were used, the investigators then faced this question: Could results obtained in earlier in-plant chlorination tests be duplicated by resuming 5-ppm. break-point residuals?

To get the answer, the feed rate of the chlorinator was readjusted to again produce 5 ppm. of free residual chlorine. Within the next 30 days, three sets of samples were taken at each station.

Outcome of these tests conclusively showed that in-plant chlorination reduced the number of bacteria throughout the plant. At every sampling point, the bacteria count was lower than that on the incoming fish. Indeed, the count at the third station was less than 1—3,000th of the original high count obtained when marginal chlorination was employed.

Cleaner Plant

And now about those other benefits from in-plant break-point chlorination: First, there was a marked reduction of "fishy" odors in areas serviced by the chlorinated salt water. Second, slime was eliminated from working surfaces in contact with this water. Both of these are more than aesthetic benefits. The presence of off-odors in a plant and slime on equipment are not healthy conditions nor are they conducive to the manufacture of quality products. Furthermore, they tend to have an adverse effect on guests and customers who visit a plant.

Here is how Gorton-Pew employs its in-plant system: Salt water is pumped to the chlorinator, which automatically feeds chlorine into the pump suction. The rate of feed is proportioned to obtain a constant, predetermined chlorine strength in the varying water flows. Proportional feed is actuated by a pressure differential obtained from the two sides of the orifice plate in the water line, the differential varying with rate of flow.

During the entire working day, the feed rate of the chlorinator is set to maintain 5 ppm. of free residual chlorine in all process water. But in the evening clean-up period, the residue is increased to 25 ppm. Thus, the company is using water containing a bactericidal agent at all times. And whenever the water is used, it does a sterilizing job.

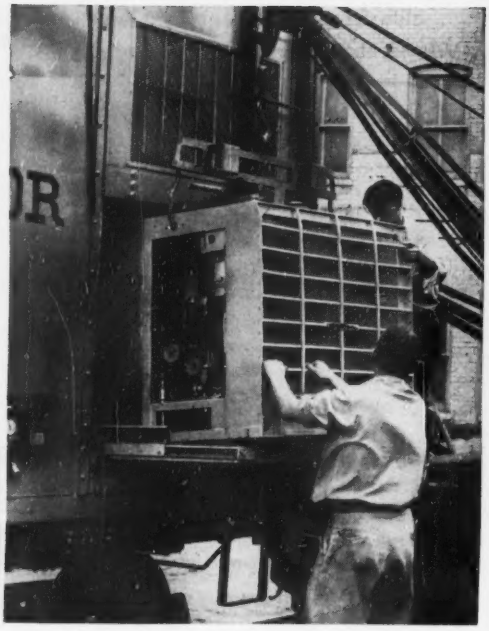
A 4-in. pipe feeds the chlorinated water throughout the plant. The first

(*Turn to page* 178)

Break-Point Does It Better

TABLE—AVERAGE RATIOS of Bacteria Counts at the Different Stations to Bacteria Counts on Incoming Fish Show Drop With Break-Point Method, Increase With Marginal Method. (Counts on incoming fish are here arbitrarily set at 1 to compensate for variations, and readings at subsequent stations are computed as ratios to this figure.)

	Stations	Ratios With Break-Point Chlorination (5 ppm.)	Ratios With Marginal Chlorination (0.1 to 0.2 ppm.)	Ratios When Break-Point Chlorination Was Resumed
1.	Incoming fish	1.	1.	1.
2.	Drip from scaler	0.06	20.2	0.022
3.	Drip from belt from scaler	2.30	295.0	0.090
4.	Swab of same belt	0.40	39.2	0.140
5.	Drip from far end of same belt	0.50	43.6	0.280
6.	Drip from cutting belt nearest scaler	1.10	191.0	0.670
7.	Swab of same belt	3.30	20.5	0.160
8.	Drip from far end of same belt	0.35	216.0	0.320
9.	Swab of cutting bench	**1.10**	**29.8**	0.170
10.	Fillet from brine tank	4.50	29.7	0.630



Kept right by this compact unit . . .

Self-contained assembly rests on "slide-drawer" base. After two simple connections, unit is pushed into car. A pair of the "packages" was used in test reefer.

. . . apples travel far in top shape

They termed fruit O.K. after 7½-day trip. L. to r.: J. Townshend, Canadian Nat. R.R.; P. Brougham, Canadian Pac. R.R.; and O. Young, principal research engineer, PFES.

"PACKAGE" REEFER COOLER . . . It Heats, Too

Mechanical "heat pump" equipment guards temperatures of foods in R.R. transit. Unit is put in quickly, comes out just as fast for check-ups or replacement

H. P. PLUMMER
Montreal, Canada

Newly developed railway car refrigerator units—adaptable for heating as well as cooling— have been successfully tested in transcontinental trial runs by engineers of the Pacific Fisheries Experimental Station of the Fisheries Research Board of Canada.

The equipment is mechanically operated and is of the self-contained "package" type similar to the kind used in refrigerated trucks and trailers. Two units are used for each car.

By application of the "heat pump" principle, a simple switch will convert the equipment into heating or cooling devices. Each unit is powered by a 4-cylinder gasoline engine, of 26½ hp. maximum capacity, driving a 6-cylinder Freon-12 compressor.

Although 26½ hp. is three to four times more power than necessary for the compressor, it was selected as insurance against any failure due to overload.

Eventually, the units will be equipped with "robot" controls for maintaining the required temperatures —tuned to cope automatically with the range of weather conditions encountered in Canada. But, during the early experiments, the switch-over from "cooling" to "heating" was done manually.

Results of the initial tests with perishable foods have been sufficiently encouraging to warrant application of the equipment in building new types of Canadian refrigerated cars.

Warm and Cold Trial Runs

In cross-Canada experimental runs over the Canadian National Railways last July, frozen fish was transported from Prince Rupert, B. C., to Montreal and Halifax, as well as from the Nova Scotia capital westward to Vancouver. These trips clearly demonstrated the car's practicability in maintaining the cargo over long distances at a high quality level at inside temperatures from —2 to —6½ F.

During the 3,000 mi. run from Halifax to Vancouver, the test car encountered abnormally high temperatures of 109 deg. F. in the sun and 92 in the shade.

Under contrasting conditions last February, an experimental car was loaded with 800 boxes of apples (50-lb. each) at Kelowna, B. C., and consigned to Montreal, Quebec. With the thermostats set at about 33 deg. F. and the switches set to "heating", the fruit arrived 7½ days later in excellent condition.

While this specific road test was in progress, the outside temperature rose one day to 43 deg. F. Thermometers inside the car indicated the tempera-

ture was rising above the 36-deg.-F. limit suggested by the Department of Agriculture. Therefore, it was necessary to change the operation from "heating" to "cooling". This move saved the fruit and served to demonstrate the equipment's usefulness under varying conditions.

Thorough Check on Temperatures

In order to investigate the temperature distribution within the loadable space in the experimental car, 24 electrical resistance thermometers were placed inside, as follows: 9 on the floor (3 across each end and 3 across the center at the doorways); 9 on the ceiling (one above each floor thermometer); and 6 on the horizontal center plane of the car.

Also, to check on the evaporators of the units, resistance thermometers were placed at the air inlet and outlet of each.

In order to relate interior and exterior conditions, 4 resistance thermometers were positioned outside the car—one under the chassis; one halfway up one end; one on the roof under the running board; and the remaining one on the roof in the direct rays of the sun.

Temperatures at all of these 32 points were recorded remotely by instruments set up for the investigators in a tourist car coupled to the experimental car during the road tests. Using the data derived, graphs were drafted to give a visual perspective of the temperatures enroute. These have proved of great value in subsequent reference.

Triple lines were scribed on the graphs to represent top, center, and bottom temperatures. Points are also marked in to show when defrosting took place. Several slight temperature irregularities noted during the trips were caused by failure of condenser fan belts. In one case, a jet in one of the carburetors became temporarily blocked.

The tests from Prince Rupert lasted about 8½ days (206 hr.), during which time the mechanical units ran 188 hr. and the evaporators were defrosted five times. Approximately 220 Imperial gal. of gasoline (275 gal. U. S.) were consumed—not including about 4½ gal. used for precooling. About 4 gal. of lubricating oil were used, including that replaced by new oil at the end of this first test.

During this Prince Rupert run, the mean temperature of the car was below zero for the entire trip. In fact, the rather close agreement reported between the mean top and bottom temperatures in the car indicated that the air circulation through the jacket was good and that there were no sections of the car where the temperature was significantly different from that at other sections.

Test data show that the "packaged" mechanical units are capable of maintaining sub-zero temperatures automatically for prolonged periods in moderately insulated cars. However, in order that the mechanical system be freed, as far as possible, from the necessity of servicing during long shipments, a number of modifications and additions are indicated.

Accordingly, it is recommended that: 1. Fuel capacity be 350 gal.; 2. oil capacity be 5 gal. for each unit; 3. defrosting be automatic, self-contained, and take place every 24 hr. of engine operation; 4. units be equipped with safety devices, such as high temperature and high pressure cut-outs; 5. temperature in the car be controlled by a single thermostat of a compensating type and fitted with separate electrical connections for each unit; 6. engines be equipped with adequate air filters; 7. housing for that portion of the units subject to external conditions be weatherproof to prevent accumulation of snow, hail, etc.; 8. engine ignition system be weatherproof; and 9. fan systems be made reasonably trouble free.

Car Stripped and Rebuilt

To carry on these experiments, a standard, overhead-cooling type of refrigerator car, completely stripped except for the exterior metal sheeting, doors and hatch-covers, was placed at the disposal of the experimental station engineers.

In this skeleton car, a new metal floor was welded, and holes were cut in the roof for the two "Thermo King" package-type units (made by U. S. Thermo Control Co. of Minneapolis) that were selected for the tests. The two compartments built in the end of the car to house the equipment were sheathed with metal. Then, all the interior seams of the car were sprayed with a water-proofing material (Insul Mastic) to serve as a vapor barrier for the insulation.

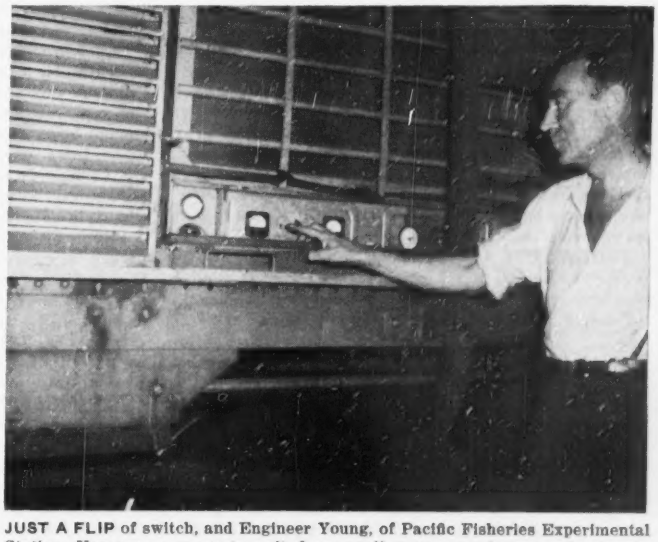
Special "Jacket" Aeration

Engineers decided to depart somewhat from the orthodox cooling method of blowing cold air over the bulk of the load. Instead, the car was equipped with a "jacket" through which the cooled air could circulate. This jacket was provided with vents leading into the body of the car and so arranged that part of the cooling or heating air could be directed through the load.

All the interior members to support the insulation, the modified overhead tanks, and jacket were composed of standard dimensioned lumber. Thickness of insulation used on the walls approximated 3⅝ in., with a similar width in the air-jacket. The insulation on the floor and ceiling was about 5⅜ in. thick. That on the ends was of varying thicknesses because of the corrugation in the metal covering, ranging from 3⅝ to over 7 in.

A number of lightweight thermal insulators were used in the car. These included expanded ebonite (Rubatex) and three grades of Fiberglas ranging

From cooling to warming in a jiffy



JUST A FLIP of switch, and Engineer Young, of Pacific Fisheries Experimental Station, Vancouver, converts unit from cooling to warming—or vice versa.

in densities from 1½ lb. to 4¼ lb. per cu. ft. They were used in different parts of the car—wherever their physical properties lent themselves to easy installation or specific service. For example, the expanded ebonite afforded structural strength, so it was used in certain sections of the floor to sustain weight.

Tank for Auxiliary Cooling

In order that the experimental car might have the desired flexibility affording as wide application as possible, it was fitted with shallow (6-in. deep) aluminum overhead-type tanks around which the return air may circulate in both its heating and cooling cycle.

Auxiliary cooling materials such as ordinary ice or dry-ice, can be used in these tanks to assist the mechanical units in supplying additional refrigeration, such as required to cool quickly a new carload of fresh fruits or vegetables still in field-heat condition. This kind of load imposes the greatest demand that may be placed on any car. Without such help, it would normally require over 24 hr. for the units to handle this pre-cooling job. But by using the modified tanks containing 2 tons of ordinary ice, it is possible to pre-cool a "warm" carload in about 10 hr.

The evaporator and air-cooled condenser are so balanced that their functions may readily be reversed for the aforesaid heating purposes—operating on the "heat pump" principle. In other words, heat can be pumped into or out of the car merely by the manipulation of valves in the refrigerant circuits. In eventual operations, it is hoped, as stated, to have the valves controlled automatically, reacting to whatever weather conditions are encountered.

In addition to the ordinary indicating devices found on the modern trucks and automobiles, each unit has an "hour meter" to show its elapsed running time. Check-ups and reconditioning of the machine can then be performed according to the reading.

Equipment Easily Removed

Overhauling and repairing need not be done on the unit while it is in the car. For, by merely disconnecting the fuel and electrical lines, the entire unit may be lifted from its base and a reconditioned one put in its place. Such an operation takes only a few minutes. Furthermore, the strategic component parts of the assembly are joined together with special unions, so that equipment pieces can be re-

(*Continued on page* 178)

"Thumb-Nail" Checklist Of Recent U. S. Tests

The following reports, just released by the maker of the "package" unit, give quick facts on nine 1949 rail shipments of varied food products, all protected by the new temperature-control equipment.—Editors.

APPLES—798 boxes, 2,100 mi., Washington to Illinois, Feb. 24-Mar. 3. Trip made in Western Fruit Express car #67564, supervision USDA. Outside temp. at loading, 41 deg. F. System operated on cooling or heating as required, since outside temp. varied between 16 and 51 deg. F. during trip. Greatest differential between bottom and top commodity temp., 1.6 deg. Fuel consumption, 16.75 gal. *Fruit arrived Chicago in perfect condition; held in car 1 wk. under refrigeration before unloading.*

POTATOES—45,000 lb., 1,300 mi., North Dakota to Texas, Mar. 31-Apr. 7. Same car, same supervision. Outside temp. at loading ranged 16-40 deg. Thermostat set at 45 deg. immediately after loading, and units operated on heating cycle. At Kansas City, thermostat setting lowered to 43 deg., where it remained for balance of trip. As car progressed southward, temp. rose and unit operated on cooling cycle. Outside temp. at Austin, 83 deg. Average temp. in top section of car for trip, 45.8 deg.; for bottom section, 46.4 deg. Estimated fuel consumption during 75-hr. operation, 37 gal. *Despite a severe bumping of train enroute that shifted load several feet, "package" units suffered no damage.*

FROZEN PORK LOINS—38,058 lb., 1,332 mi., Minnesota to Virginia, May 27-June 1. Same car. Outside temp. ranged 50-75 deg. Temp. of product at loading, 6-7 deg. *Product delivered in excellent condition at 2-6 deg.*

MEAT PRODUCTS—Shipment of beef, lamb, pork, etc. (Swift & Co.), 890 mi., Illinois to Louisiana, Aug. 18-Aug. 22. Same car, but changed from direct air circulation to semi cold-wall circulation plan. Precooling for 8 hr. reduced car temp. from 78 to 9 deg. Units were shut off for 8½ hr., and interior temp. was 39 deg. when loading started, with temp. of load 30-49.5 deg. Thermostat set at 35 deg. Fuel consumption, 48 gal. Cost of fuel, $12.48. *Temp. of load in center of car at unloading was 35.5 deg. Commodity that had been loaded at 49.5 deg. was 34.5 deg. at unloading. Outside temp. varied between 71 and 91 deg.*

PACKING HOUSE PRODUCTS—Shipment (Swift & Co.), 848 mi., Illinois to Louisiana, Aug. 31-Sept. 6. Same car. Thermostat set at 35 deg., and car precooled. Temp. of car 33 deg. at start of loading, 36 deg. at end. Units turned on for 150½ hr. from start of precooling to end of unloading. During this period, unit cycled off and on. Thermostat set for 28 deg. for trip. Fuel consumption, 70 gal. *Mean temp. of car at center during trip was 28-30 deg. When unloading started at Shreveport, mean temp. was 29 deg.*

SAUSAGE—Shipment (Swift & Co.), also contained other packing house products, 1,513 mi., Texas to Pennsylvania, Sept. 9-Sept. 16. Same car. Product temp. at loading, 38-40 deg., with outside temp. varying between 54 and 100 deg. Car arrived at Lebanon Sept. 14. Unloading done at intervals. Temp. in center of car at start of unloading averaged 44.3 deg. Units turned off 8:35 a.m. Sept. 16. Fuel consumption to Lebanon, 36 gal. Fuel consumption during unloading, 8½ gal.

FROZEN SMOKED BELLIES—2,250 mi., Wisconsin to California, Sept. 27-Oct. 4. Shipper again Swift & Co. Same car. Primary purpose of test was to compare new type refrigeration with former ice refrigeration, attempt being made to deliver load at slicing temperature. Temp. of product at loading ranged between 0 and 17 deg. Outside temp., 43-96 deg. Fuel consumption, 60 gal. *At arrival, product temp. averaged 20 deg., with little variation at different points of load.*

FRESH FROZEN STRAWBERRIES—67,372 lb., fruit packed in sugar (Birdseye Frosted Foods), 3,100 mi., Oregon to New Jersey, Sept. 16-Sept. 25. Trip in Fruit Growers Express car #39897. Average product temp. at loading, 4.7 deg. Outside temp. 32-90 deg. Fuel consumption, 180 gal., including precooling operation. *Air temp. in car at unloading, minus-10 deg. Average product temp. at unloading, minus-3.3 deg.*

FROZEN ORANGE JUICE CONCENTRATE—77,112 lb. (Vacuum Foods Corp.), 1,190 mi., Florida to New Jersey, Oct. 11-Oct. 15. Same car as used in preceding shipment. Average product temp. at loading, 0 deg. Outside temp. ranged between 58 and 83 deg. Fuel consumption, 125 gal., including precooling operation. *Air temp. in car at unloading, minus-10.5 deg. Average product temp. at unloading, minus-6.1 deg.*

CORRECT METHOD of stacking in storage. Staggering baskets on edges of those beneath keeps pressure from center of lids, and stacking right-side-up instead of putting alternate baskets upside down, permits better air circulation.

Stored Apples

Why They're Lost and How They're Saved

You can be sure of having "the most of the best" if you constantly maintain proper conditions, regularly examine the fruit for maturity and defects, and sagely consider the softening and rot factors when making your withdrawals

LOU BISNO
Bakery Chemist and Production Consultant, Burbank, Calif.
Photos From USDA Bul. 659

CONCLUDING PART III

In the storage room itself there are a number of factors that influence the length of time apples may be safely held. Among these are temperature, humidity, air circulation, method of stacking, storage with other products, and sanitation.

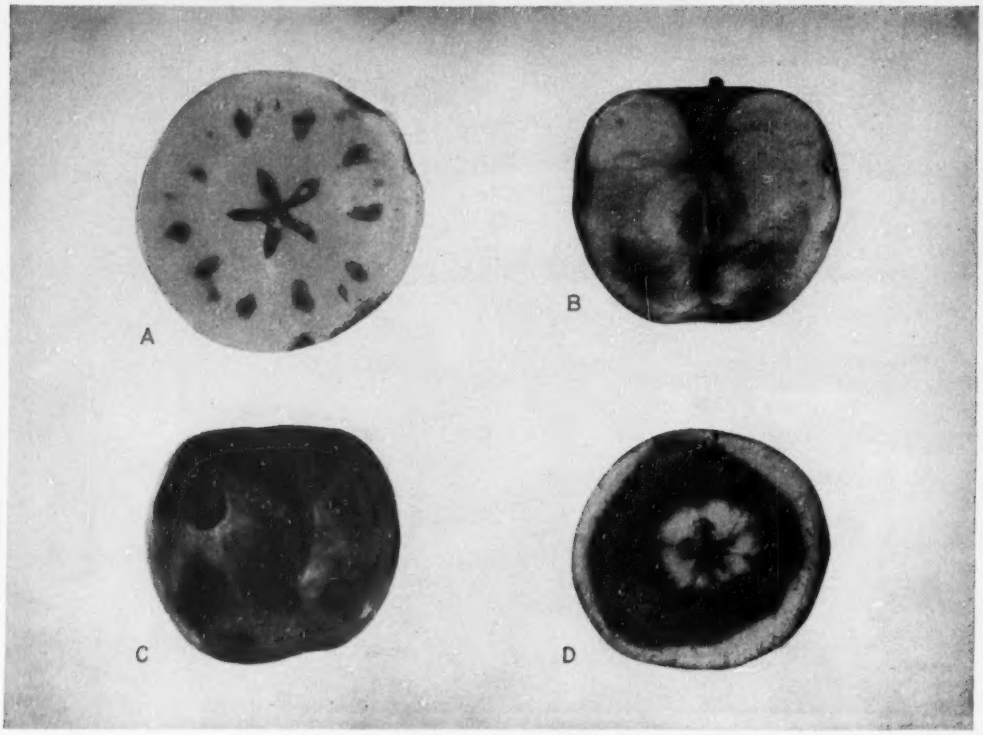
The beneficial effects to be gained through careful attention to the pre-storage factors—such considerations as suitability of fruit varieties, uniform grading, proper maturity, and most favorable methods of picking, handling and temporarily storing—were examined in the first two parts of this article. We will now go on to the effect of conditions within the storage room.

Temperature a Prime Factor

As stated in the discussion of maturity, the apple is a living organism that consumes oxygen and produces CO_2 and other products. It is subject to external influences as to rate of living (respiration). Among these influences are temperature and composition of the surrounding air. As the temperature is raised, the rate of softening of the apples (Table I) is increased. The rise is roughly proportional to the rate at which CO_2 is generated.

At 32 deg. F., the apples, on the whole, softened about 25 percent faster than at 30 deg.; at 40 deg. more than double that at 32; and at 70 deg. approximately twice as rapidly as at

Appearances Indicate Probable Apple Storage Life



FACTORS to look for. Internal: (A) Water core, denoted by glassy or water-soaked appearance of flesh around core or main vascular bundles; (B) general mealiness and brownish discoloration of the flesh, (D) soggy breakdown. External: (C) Soft scald, which makes apples look as if they were rolled on a hot stove.

50. Relative life of apples stored at various temperatures is given in Table II.

Although 30-32 deg. is desirable for storage of most apples, there are varieties which require a higher temperature. For example, the tendency to internal browning and brown core, in Yellow Newtown apples from the Pajaro Valley in California, is greatly reduced when storage is at 36 deg. And Grimes Golden, stored at 34-36 deg. F., suffer far less from soggy breakdown than when held at 32, this being particularly true if the apples have been held at 50 deg. for two or three weeks prior to further cooling[8]. In the case of New York McIntosh apples, storage at 36 deg. greatly reduces internal browning. Much depends, however, upon the length of time the fruit is to be held.

Conditions in Storage Room Vital

In cutting down losses, an important part is played by good storage room conditions:

The amount of refrigeration available, the extent of air circulation, and the manner of piling the fruit should be such as to permit the cooling of all the apples to 30-32 deg. within approximately one week. And air circulation should produce a uniform temperature at all points in the room.

Apples should be kept separate as to purchase lot and variety, with the late keepers and earlier varieties in separate rooms. Each lot should be stacked to permit periodic examination of representative containers.

No other foods should be stored in the same room with apples.

Containers should be piled eight high under ordinary circumstances. In any case, sufficient head-room should be left to permit access to containers near the center of the block.

As regards boxes or crates, dunnage strips must be used between each horizontal row and the one above it, along with a small space between the vertical rows to permit air circulation. Supports, such as 2 x 4 lumber should be used for the bottom row to facilitate circulation under it.

Boxes with bulging tops should be piled on their sides.

In the case of bushel baskets, each container should be staggered on the edges of those beneath it, as illustrated in our initial photo. All baskets should be set right side up.

Different Containers Used

Among the storage containers in use are: (1) Bushel baskets, both continuous stave and export tub type, (2) standard boxes, (3) 1 1/5-bu. eastern crates, (4) field boxes, crates or boxes of special construction, and (5) barrels. The export tub has rigid sides and bottom, with the lid providing sufficient firmness to keep contents tight when properly packed.

One form of crate has vertical corner posts, triangular in cross-section and extending 2 in. above the walls of the crate. These posts eliminate direct pressure on the fruit from the container above. In addition, the space thus provided between crates permits ready air circulation. A great many second-hand containers are being used and much damaged fruit frequently results when defective ones are not culled out.

Lack of rigidity in containers results in undue pressure upon the fruit. For example, moldy apples may be tightly pressed against sound ones, resulting in bruising and softening of the good fruit, with consequent infection. When a large number of open lenticels exist, this infection may become very pronounced. It is not an uncommon experience, when examining apples in a container, to find a clump of four or five rotten apples resulting from this condition.

Barrels are not greatly used any more—for cooling of apples in them is slow as compared to that in the smaller containers. Table III gives data on cooling in several types of packages (storage in still air at 32 deg. F.[2]).

It is apparent that cooling is slowed by the addition of a liner cushion, and oiled paper. Increased life of the fruit stored under these conditions, however, warrants the additional refrigeration required to speed up cooling.

Air Speed Helps

Removal of heat from apples going into cold storage is speeded by forced circulation of air. This increased rate also produces a more uniform temperature than otherwise possible. At the same time, the tendency toward freezing, due to pockets of cold air, is reduced, as is also excessive ripening because of accumulation of gases emanating from the apples. Table IV shows relative cooling effects (in time required for apples to reach 32 deg. F.) in still and moving air when stored as in commercial practice.[2]

With low relative humidity in the storage, apples lose moisture. And when this loss reaches 5 percent, a shriveled appearance of the skin results. If, on the other hand, the relative humidity exceeds 90 percent, rapid mold growth is encouraged. However, at 85-88 percent, mold growth is controlled and shriveling is practically eliminated.

Apples piled against, or close to, refrigeration coils frequently show evidence of freezing or shriveling, with the development of a rubbery texture. Tendency to develop these defects is reduced by allowing space for free circulation of air between the coils and the fruit.

Extent to which moisture is removed from apples is evidenced by the rate of accumulation of ice on the coils, where direct refrigeration is employed. By directing powerful fans against coils showing this condition, ice is gradually removed and the humidity in the air is increased. When the humidity is lower than desired, sprinkling of water into the air or on the floors will help to raise it.

Percent relative humidity is determined by use of a hygrometer. The wall or table type instrument consists of two thermometers. The bulb of one is attached to a wick kept immersed in distilled water. This is the "wet bulb" —as differentiated from the other, the "dry bulb." To use, air is fanned around the bulbs for about a minute, then thermometer readings are taken. By means of a chart furnished with the instrument, the difference between dry and wet bulb readings is translated into the relative humidity figure. If the room temperature is under 32 deg. F., the wet bulb wick is not used. The bulb is simply covered with a thin layer of distilled water and fanned to obtain the decrease in temperature. The sling type hydrometer is whirled for about 20 sec. before readings are taken.

Sanitation a "Must"

At all times, sanitary conditions must be maintained in apple storage rooms, because mold spores spread very quickly. A study by Clyde M. Christensen showed that mold spores, liberated on the first floor of a 4-story building, were carried throughout the entire building in 5 min. emphasizing the importance of their control[1]. Some of the factors making for satisfactory sanitation are:

1. Properly built and insulated rooms to prevent dampness on walls and ceiling.
2. Smooth wall and ceiling surfaces.
3. Use of fungicidal paints or finishes.
4. Washing of floors, walls and ceilings as conditions permit.
5. Use of a disinfectant on floor—scrubbing with water containing 2.5 percent sodium hypochlorite together with a wetting agent being recommended.
6. Use of a gaseous disinfectant. Sulphur dioxide, produced by burning 1 lb. sulphur per 1,000 cu. ft. of air, may be used[3]. This should be burned in a metal vessel supported off the floor by nonflammable material, such as bricks. All openings to the room must be tightly closed for at least 1 hr., after which the room is to be thoroughly aired. Since SO_2 is injurious to apples, this operation should be performed when the room is empty. And there should be precautions, such as the use of gas masks to eliminate danger to workmen.

Long-keeping apples, for use during

Temperature vs. Keeping Quality . . . Cooling is Influenced by Packing

TABLE I—STORAGE LIFE of Apples Decreases Extremely With Increases in Temperature*

Storage Temperature Deg. F.	Storage Period	Pressure Test Lb.†
30	7 mo.	10.5
32	6½ mo.	10.5
36	3 mo.	11.2
40	2 mo.	10.0
50	1½ mo.	9.2
60	23 days	9.2
70	20 days	10.0

* Magness, J. R., *et al.*, "The Ripening, Storage and Handling of Apples." USDA Bul. 1406, Aug. 1926.
† At start of study pressure tests were approximately 16 lb.

TABLE II—RELATIVE LIFE of Apples Increases Markedly With Decrease in Storage Temperature

Storage Temperature Deg. F.	Relative Life
70	1
50	2
40	4
32	9
30	12

TABLE III—RATE OF COOLING of Stored Apples is Influenced by Method of Packing and Type of Container. (Unstacked Containers, Still Air at 32 Deg. F.)

		Temperature at Core of Apple in Center of Package Deg. F.					
Package	Packing Material	When Stored	After 12 hr.	After 18 hr.	After 72 hr.	After 7 Da.	After 10 Da.
Bushel basket	None	63	42	32.0	——	——	——
Bushel basket	Liner, cushion, shredded oiled paper	70	59	44.5	41	33.5	32.5
Barrel	None	66	64	59.0	55	41.0	36.0
Standard box	Liner, cushion, oiled wraps	71	67	60.0	54	41.5	37.0
Eastern crate, 1 1/5 bushel	Liner, cushion, shredded oiled paper	66	63	61.0	59	54.0	44.0

TABLE IV—TIME OF COOLING of Apples to 32 Deg. F. in Commercial Storage Depends Upon Method of Packing and Movement of Air

Medium	Containers With Liner, Pad and Shredded Oiled Paper (Time Hr.)	Containers Without Liner, Pad, or Shredded Oiled Paper (Time Hr.)
Still air	160	99
Moving air*	57	36

* Approximately 200 fpm.

the latter part of the storage season, may be purchased on several bases. Among them are:

1. Outright purchase, in which the buyer necessarily assumes all depreciation during storage.

2. Contract for delivery of sound apples at all times. The seller assumes losses due to spoilage or assumes the losses incurred by purchaser if the apples are not regraded prior to delivery. In some cases the seller assumes losses up to a given date—June 1, for example.

3. Daily purchases, as needed.

Purchase may be made on the basis of cost per 100 lb., or on the container basis. In the latter case, buyers often insist upon containers filled beyond the safe limit from the standpoint of long storage and thus may incur extra losses in deterioration.

In checking upon the weight of apples received, it is often the practice to dump and actually check a given number of bushel baskets or boxes, after recording the gross and tare weights, unless there is a large scale tank available. Considerable differences in tare weights are often found, especially when second-hand containers are used. This situation brings up the question of accuracy of the net weights as calculated. The actual net-weight under these conditions may be obtained by getting certified gross and tare weights of the vehicle (box car or truck) upon delivery, then actually weighing all emptied containers.

Regardless of the purchase basis, the user pays for the losses incurred in storage. It is in the interest of all concerned, including the grower, to hold these losses to a minimum. It thus behooves the owner to check the apples thoroughly at the time of purchase or shortly after delivery to storage, and periodically thereafter.

Method of Checking

When the owner depends upon the personnel of the storage warehouse to inform him as to undue depreciation in the stored apples, it is difficult to obtain satisfactory checks. Significant data require removal of a number of packages from different parts of the storage lots, dumping these containers, examination of the individual apples, and recording the results. A suggested Apple Record Form for this examination accompanies this article.

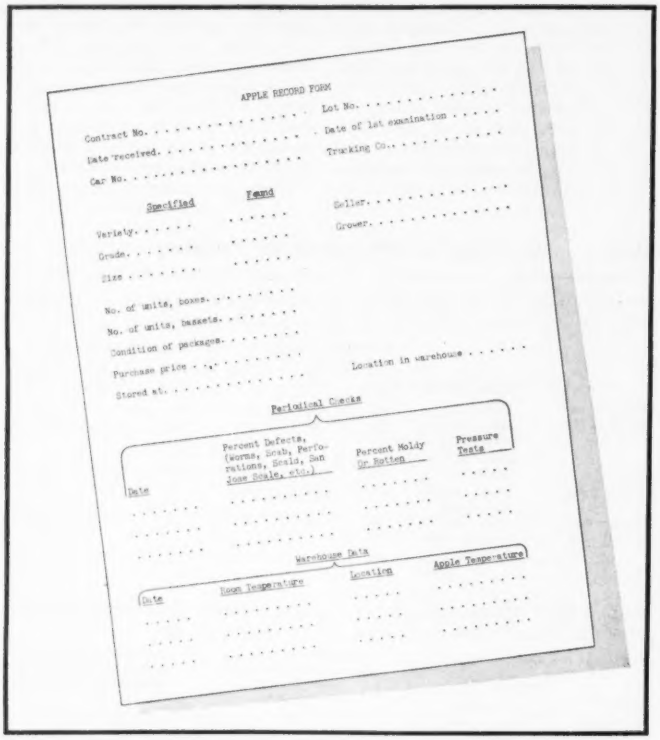
For the pressure tests at each check, eight apples are used. They should be fairly representative of the container, and two readings should be taken on each—on opposite sides of the apple, blushed and unblushed, when the apples are colored. All readings are noted, and a record kept of the approximate percentage of those within the desired range, as well as of those below it.

Once a container is checked, it is dated and is not used for subsequent checks. Periodical examinations, at two- or three-month intervals, will reveal if the percentage of soft apples is increasing to the point justifying withdrawal from storage. On the other hand, the examinations will show whether the apples are too hard to bake properly and are under-developed as to flavor.

Portable paraphernalia are used in making these checks: (1) A pointed pocket thermometer, (2) a pressure tester, (3) size grading rings, and (4) a hydrometer.

In view of the benefits to be derived from the type of examination discussed, the cost is small. A man with some experience can examine more than 100 bu. per working day. Checking 2 percent of the number of containers involved, this represents 5,000 bu. The cost, therefore, is likely to approximate ½¢ per bushel. With four examinations per year, the total added cost is approximately 2¢ per bu.

Careful Records Suggest Withdrawal Date



APPLE RECORD FORM

Contract No. . . . . Lot No. . . . . .
Date received. . . . . Date of 1st examination . . . . .
Car No. . . . . Trucking Co. . . . . .

	Specified	Found
Variety.		
Grade.		
Size		
No. of units, boxes.		
No. of units, baskets.		
Condition of packages.		
Purchase price		
Stored at.		

Seller. . . . . .
Grower. . . . . .
Location in warehouse . . . . . .

Periodical Checks

Date	Percent Defects, (Worms, Scab, Perforations, Scald, San Jose Scale, etc.)	Percent Moldy or Rotten	Pressure Tests
. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .

Warehouse Data

Date	Room Temperature	Location	Apple Temperature
. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .
. . . . .	. . . . .	. . . . .	. . . . .

Essentials Briefed

Reduction of apple losses in storage may be effected at low cost by proper consideration of the following:

- Variety
- Maturity, as to both degree and uniformity
- Source (particular area or grower)
- Age of orchard
- Freedom from defects
- Handling procedure, relative to fruit injury

Adequate storage conditions, including temperature, humidity, air circulation, sanitation, method of piling, accessibility of all lots and of various representative parts of each lot.

Examination of fruit as stored and at intervals of about three months thereafter, using the pressure test as an aid.

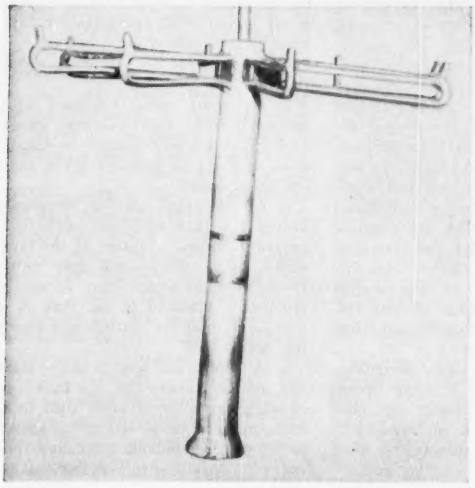
Withdrawal of the various lots on the basis of the rate of softening and development of rots.

Proper keeping of records and utilization of the data to improve purchasing and storage.

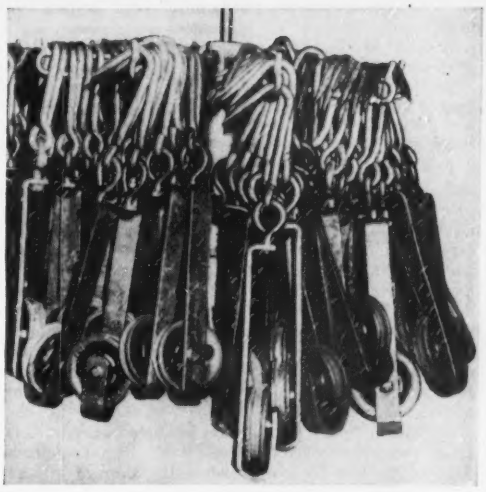
References

1. Christensen, C. M., "Molds and Bacteria in Flour." *Bakers Digest*, Feb. 1947.
2. Fisher, D. F., *Handling Apples from Tree to Table.* USDA Circ. 659, Aug. 1942.
3. Harding, P. L., *Physiological Behavior of Grimes Golden Apples in Storage.* Iowa State College of Agriculture & Mechanic Arts, Agr. Expt. Sta. Research Bul. No. 182.

When these trolleys need treatment . . .



. . . this handy tree . . .



. . . racks over 80 for quick servicing

Wax the Trolleys and Protect the Product

Packer cuts drip-caused trim losses, also man-hours with new process that does 3-way job of cleaning, lubing, and protecting carriers. Method available to all

M. E. PARKER
Director, Food Engineering & Processing,
Illinois Institute of Technology, Chicago

A new method of wax treating gambrels and trolleys for conveying carcasses brings three specific operational advantages over older technics:

1. Elimination of grease and hence prevention of drip-spotting of animal carcasses conveyed on trolleys.
2. More thorough and effective lubrication of trolley-bearing surfaces.
3. Extension of the life of trolleys and gambrels.

Briefly, the new system calls for loading the trolleys or gambrels on special trees and dipping them for a fixed time in a tank containing a new melted wax compound. Thus, this system does away with the old method of hand oiling the exposed surfaces.

After a trial use of more than three years in three plants, the system is now being generally installed by Armour and Company, and it is being made available for use throughout the meat-packing industry. Moreover, it has a potential use in various other branches of the food-processing industry where foods or food materials are conveyed in troughs, racks, pails or buckets suspended from overhead trolley rails.

The improved method of treating trolleys and equipment was developed by William F. Weber, working under D. W. King, in charge of Armour's Development & Standardization Div. Patent applications have been filed covering the unusual features of the operating equipment, the improvements, method of treatment and the compound used.

A feature in the development is the

use of a lubricant that differs from those previously used. Cooperative work with the National Wax Co. resulted in a highly specialized wax lubricant. This product has a high melting point, is free from gummy or "anti-slip" characteristics, has no oily flavor, and is stable over a wide temperature range—the desired properties of good lubricating oils. Furthermore, this wax adheres closely and tightly to metal and bearing surfaces, to provide a continuous, thin, dry, "nonleaky" coating which retains its lubricating properties under constant use and despite wide variations in temperatures and operating conditions. It also does an excellent cleaning job—removes sludges and impurities without change in lubricating properties or loss in performance efficiency.

This wax lubricant is now a standardized product, available in drums.

System Saves Operating Costs

The new system was originally installed in one of the company's packing plants where there had been a loss of meat because carcasses became spotted through oily and greasy drip from trolleys, gambrels and rails. Immediately there was a direct savings in dollars. For no longer was there any need to trim carcasses to improve their appearance, also dressing shrink was cut down, and there was a reduction in dressing labor, gambrel handling, and cleaning costs.

Savings in trolley and gambrel handling and cleaning costs alone have justified the cost for the development and installation of this system in the plants studied.

In the investigations, operating costs of several plants using the older methods were compared with costs using this new treatment system. And it was found that the cost of installing equipment for wax treatment is amortized within a few years by savings in operating costs alone. A bonus is attained by the reduction of spotted carcasses, elimination of trim-outs and trimming labor, and improvement in neatness and sanitation resulting from the prevention of piling and handling of loose trolleys about the meat-packing plants.

Centralized Job With Special Units

Granted, the basic treating procedure can be used with a wide variety of equipment, also a variety of methods, including hand dipping and power-conveyor systems for continuous handling and treatment of trolleys and gambrels. However, such application of the system is not encouraged because it tends to become indiscriminate due to the many variations in the layouts of the packing plants and warehouses. Instead, the recommended practice is to centralize the cleaning and treating of trolleys, gambrels and, in some cases, sheep blocks, from different plant locations or departments. In so doing, a flexible and efficient system of operation is possible and space requirements decrease.

In meat-packing plants, centralization of cleaning and treating operations, with the indicated attendant advantages, has been obtained with special equipment which pays for itself through savings in operating costs.

As for the special equipment, there are four essentials:

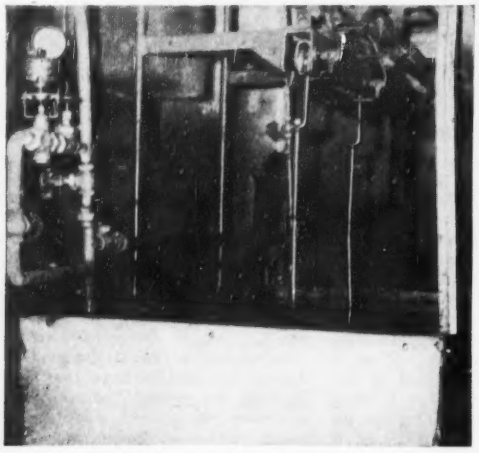
1. Trolley and gambrel trees designed to hold from 80 to 90 trolleys or gambrels each in a compact and orderly arrangement, with a trolley wheel suspension at the top and socket bases at the bottom. Loaded or empty, these trees can be moved while suspended from the rails or mounted on special transfer hand trucks, equipped with spurs over which the socket bases fit. Trolleys and gambrels are hung on the trees as they are removed from the carcasses. And they remain on the trees throughout handling and treating operations, including transfer to locations where they are to be used again. At these locations, they can be conveniently removed from the trees on the killing floor as needed. There is no handling of individual trolleys or gambrels. Moreover, loose trolleys and gambrels are not left lying about the plant.

2. Transport trucks equipped with neoprene-tired, roller-bearing wheels and spurs to hold loaded or empty trees securely in position while they are transported.

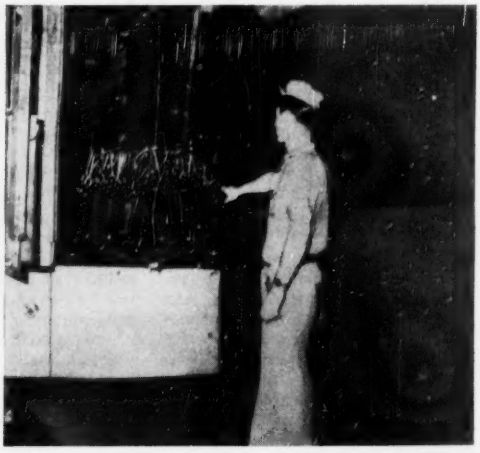
3. An insulated, gas or steam-coil heated dip tank equipped with temperature control. Bottom of the tank slopes to a sump and gate valve through which sludge may be easily removed. Attached to the tank is a pump and filter for continuously cleaning melted wax.

4. A "drop-rail" section in the meat rail mounted above the dip tank and operated by a drum hoist with limit switches and a motorized timing switch to provide dependable automatic timing of the immersion period. This drop-rail has special safety features. It is available in sizes to handle one,

How Trees of Trolleys Are Waxed, Drained, and Delivered →



1 **IMMERSED** in tank, trolleys are cleaned and recoated with lubricating, corrosion-resisting "Tra-Lese" wax.



2 **LIFTED** from dipping tank, loads of treated trolleys are thoroughly drained to remove excess wax, then . . .

two, or three loaded trees at a time, thus meeting the requirements of both small and large plants. Ordinary power hoists of the chain type can be used in those operations where it is necessary to raise and lower loaded trees from meat rail to hand trucks.

Wax Dipping the Units

After the system has been put into operation, treatment involves dipping the metal surfaces or units in the heated wax compound for a predetermined time. Dipping accomplishes two things: (1) Removes the old coating, along with dirt, grease and dust; and (2) applies a clean, fresh coating.

When the system is first started, surfaces or units to be dipped must be subjected to a tumbling action, or treated with an alkaline detergent and an acid neutralizing wash, to remove excessive rust and scale. Thereafter, no such preliminary cleaning or descaling treatment is necessary—nor subsequent or supplemental treatment.

While tumbling methods effectively remove scale, corrosion and surface dirt, considerable labor is required to load and unload the tumblers, replace cleaning agent and clean the equipment. Also, chipped trolley-wheel edges and battered metal surfaces commonly result. Such damage shortens trolley life and makes it difficult to maintain clean, smooth surfaces on trolleys and gambrels.

Strong alkaline detergents and cleaning solutions, spray washing, neutralizing and dipping in oil lubricant require several pieces of equipment that call for considerable space and supervision. In addition, there are often sloppy, unpleasant and questionable sanitary conditions that must be avoided in food plants.

Chemical removal of dirt and grease is more drastic and severe to metal surfaces and bearings than the solvent action of hot wax which, in turn, leaves a fresh protective and lubricative coating. Use of the wax at the high temperature specified in the treatment procedure provides sterilization of all treated surfaces and coating material.

Economies Cited

Lubrication by the wax-treatment method is economical. By contrast, in the oil-dip lubricating system there is excess oil on surfaces which must be wiped, thus adding to the cost. And the remaining oil becomes dirty and gummy during use and must be removed with cleaning solution.

When the wax treatment method is used, the dirty coating is melted, reclaimed and re-used with practically no loss through dripping or reworking. Since stability of the wax is high, use of controlled tank temperatures, continuous filtration, and sludge removal assures a low wax-renewal expense. Under normal care and use, the stock in the dip tank can be used for at least six months before it is replaced with fresh stock.

Advantages of New Wax

Thorough penetration of hot wax throughout the bearings, with an effective, even distribution, is shown by removal of the trolley wheels.

In operations, advantages of this improved lubrication are proven by: (1) Dependable, easy rolling of the trolley wheels on rails in coolers and holding rooms without sticking or "freezing" of bearings, (2) resistance of the lubricated bearings against drying out, and (3) efficiency of the lubrication under a wide range of temperatures.

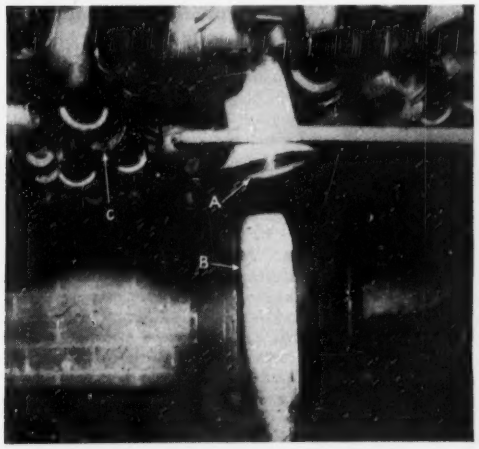
These performances were attained by the company over wide range of climatic conditions in its large South St. Paul plant for more than two years.

Method Available to All

In order that this improvement may be generally available, with assurance, meanwhile, of sufficient control for proper and effective use, Armour and Company has licensed the process and manufacture of the specialized equipment to an equipment manufacturer at a low royalty rate. The license agreement includes an understanding that the equipment be available to all. Use of the system has been "accepted" by the Bureau of Animal Industry.

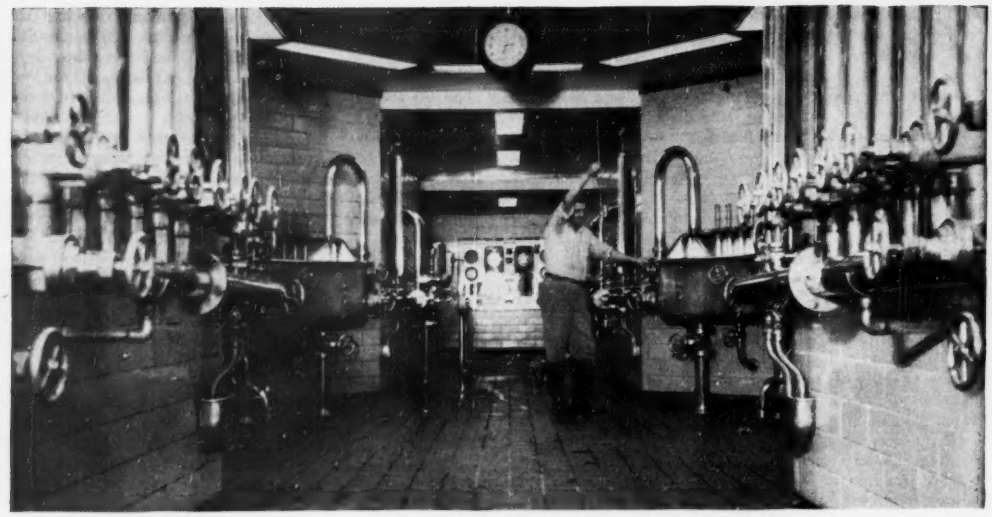
This method of lubricating and cleaning equipment and protecting it from rust and corrosion might be adapted by other branches in the food-processing fields, where less effective treatments are now being employed. When properly applied, this protective food industry type wax compound is extremely thin, dry, and non-adhesive on its surface, but it is effective in its lubricating properties.

Possibilities have not yet been investigated as regards application of the new treatment method and lubricant in fields other than meat packing. However, full details on the process are available to anyone interested. Moreover, efficient low capacity equipment has already been designed for use by smaller plants.



3 . . . **GO ON TRUCK.** Closeup shows tree base (A) going on truck spur (B). Trolleys (C) hang free.

4 **AND FINALLY** waxed trolleys are rolled on truck to various rail stations and put back to work.



FOUR LAUTER TUBS, tile enclosed, comprise new second-floor setup. Here, two combination mash and lauter tubs originally stood. Wort, after it is strained through the mash, is run off into kettles by gravity.

Output Doubled—And Then Some

Brewery gets big spurt in output right within its old walls—by re lesigning kettles and lauter tubs, adding new filters and coolers, and streamlining its layout

G. F. WAGNER
Brewmaster and General Superintendent, Brewing Corporation of America, Cleveland

Here at Carling's we are rather proud of our refinements in processing, and the substantial increase in our productive capacity resulting from a three-year modernization program recently completed.

From six brews daily with a kettle capacity of 3,300 bbl., our production has been stepped up to twelve brews a day with a total capacity of 7,800 bbl.—more than doubling our 1945 output.

Done Without New Buildings

Both streamlining of the existing equipment and the redesigning of the brewhouse production facilities to achieve new capacity were accomplished without any building alterations or major structural changes. However, a new 12-unit bottle shop was constructed to take care of the added production. Total cost of the entire modernization program was about $7,500,000.

Advanced planning which utilized all the know-how of our engineering department, suppliers, and allied trades, was geared to the production department's schedule, thus enabling us to meet our requirements without loss of production or interference with seasonal demands as the work progressed.

Good Business Started It

During the years preceding 1945, business of the Brewing Corporation of America had increased to such an extent that an added capacity of 100 percent was indicated. But to simply add more brewing units was out of the question. Present walls had to house the expanded brewing, fermenting and storage facilities.

We already had two 110-bbl. cookers, two 550-bbl. kettles, and two 21-ft. combination mash and lauter tubs. In order to increase the brewhouse capacity, two new 21-ft. lauter tubs were installed and the old combination mash and lauter tubs were converted into straight lauter tubs. Two stainless steel, horizontal mash mixers were also added.

To get maximum results from this added equipment, it was necessary to cut out the dish bottom ring from the kettles, lower and straighten the sides, and replace the bottoms with slightly conical, single shell ones. This increased the capacity of each kettle by 125 bbl. Before modernization, we were able to brew six brews a day. Kettle capacity was 3,300 bbl., and net capacity in the fermenting room was 3,060 bbl. Now, we can make twelve brews a day, 7,800 bbl. in the kettles, with a net of 7,200 bbl. in the fermenting cellars. This is much more than the 100 percent increase originally thought to be the maximum obtainable. One additional bit of information—to maintain 2½-hr. run-off time, and keep to our 3-hr. schedule between brews, grain depth in the lauter tubs, with our particularly fine grind, could not exceed 16 in.

Heating Surface Added to Kettles

Our next problem had to do with kettle capacity. To facilitate proper boiling on such a short brewing cycle, it was found necessary to add 200 sq. ft. to the former heating surface of each kettle. Because of the increased volume and high drainage rate from the lauter tubs, a higher distribution of heat to increase the surface over the heating element was also decided upon.

To accomplish this, a percolator was

placed in each kettle to operate in conjunction with the two 6-in. copper steam coils already there. When the bottom coils are covered by 6 in. of wort, steam at a pressure of 60 psi. is turned on. When the lower half of the percolator is covered, low pressure steam (30 psi.) is turned on this part. When it is completely covered, the top side of this heating element is turned on and the bottom coil is turned off.

Unneeded Precautions

At the start, we were not sure whether this surface would prove adequate to give the proper boiling temperatures, and we were prepared to install a 12-in., 500 rpm. impeller to insure proper agitation of the wort, and to present more surface to the heating elements. We were quite happy when this alternative was found unnecessary.

To remove the hops, a 150-bbl. strainer was installed between the two kettles. This is a vertical strainer with a conical bottom and has false sides and bottom. It has a low speed, motor-driven scraper on the bottom for the complete removal of the spent hops. A sparging ring is set in the top to wash out the wort from the spent hops. It is possible to remove all the hops from 650 bbl. of wort in 35 min. With a faster pump, separation could be accomplished in much less time—perhaps in 20 min.

Coolship Removed

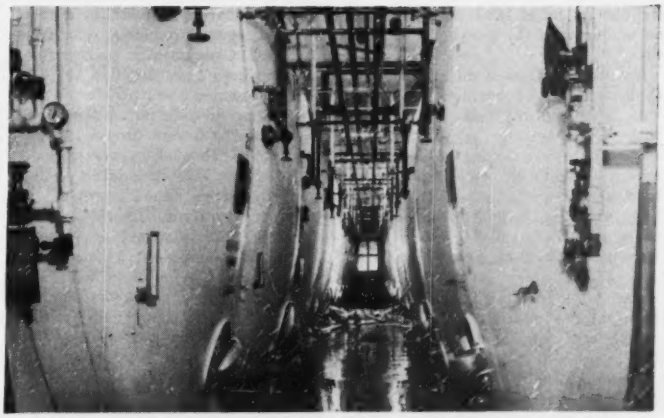
Wort filtration is practiced at this brewery and, in keeping with the expansion, capacity for filtering and cooling had to be increased. It was decided that the room left when the old coolship was removed would be entirely adequate for these operations. Walls were completely tiled, then two large diatomaceous earth filters, an open slurry tank, and three plate coolers were installed. One filter and two coolers, having a combined capacity of 300 bbl. per hr., are considered a unit.

To get proper heat transfer from a plate cooler, the plates must be taken apart and cleaned between every other brew. So, with constant cooling, it was found advisable to have the third cooler as a standby, clean and ready to exchange for the one that had been in use the longest.

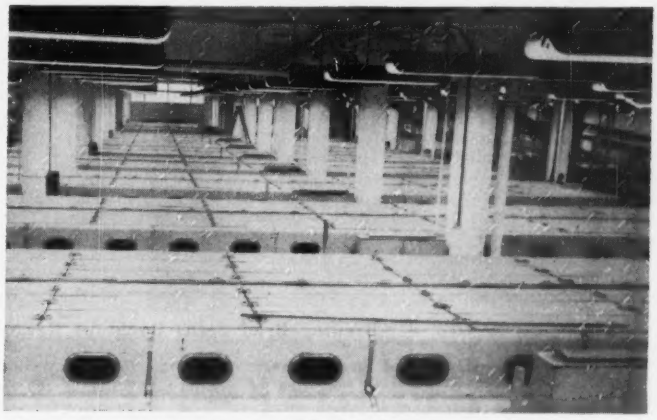
When precoating a filter, slurry is forced on the screens by a high speed centrifugal pump. This requires about 5 min. Then the wort is started, and the precoating pump is stopped. A positive displacement pump adds the required amount of diatomaceous earth to the filter during the remainder of the filtering and cooling period.

Fermentation capacity was adequate, with the possible exception of the

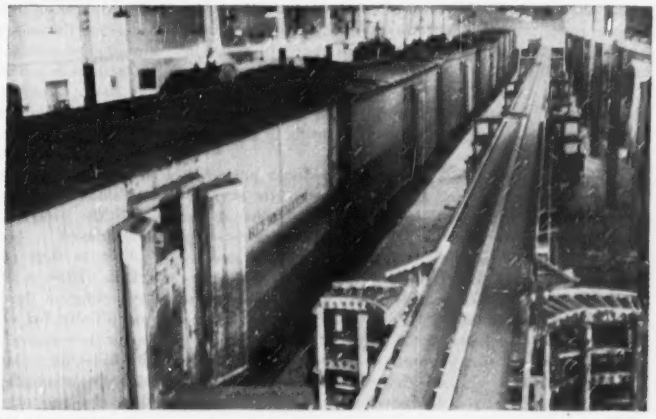
How They Got Extra Capacity



CLOSED TANKS were added to raise storage capacity by 30,000 bbl. They may be used as fermenters when additional CO_2 is needed for carbonation.



TWELVE filling lines were arranged to handle augmented output of brewhouse. Shown here are new pasteurizers—eleven for bottles, one for cans.



SHIPPING DOCKS were lengthened and expanded, making it possible to spot 45 cars and 15 trucks at one time. Unoccupied car spots may be used for trucks.

closed units for collection of CO_2 gas, but storage capacity needed to be stepped up by at least 20,000 bbl. to be in line with the brewhouse expansion.

Two new cellars were added, with capacities of approximately 15,000 bbl. each, and all tanks were fitted with attemperators to provide for cooling in case it should be necessary, at any time, to convert from storage to closed fermentation. All old beer lines were replaced with new copper tubes of larger diameter, and these were brought to a transfer cellar. Here it is possible to pump from, or to, any cellar in the plant. Cooling, carbonation, and the addition of any priming or blending can be accomplished at this point.

To eliminate the probability of human error in making the blends used in Red Cap Ale and Black Label Beer, a proportioning device was installed in the carbonating cellar. At this point, the correct amount of chillproofing material is added and, at the same time, the products are blended and pumped to the finishing cellar.

About the New Bottle Shop

Next step in the expansion program was the erection of the new bottling shop. This building was designed and equipped to handle the total weekly brewing output in five working days (two 8-hr. shifts per day). There were twelve bottling lines, each equipped to handle the same type non-returnable bottles. However, a survey of the market revealed the advisability of again producing returnable packages. Consequently, soakers were added to lines 1, 2, 3, and 4.

This presented a new problem in that the soakers had to be put on the second floor, and the towers dropped to the first, where the washers were located. It is the first such installation in this country, and we have encountered no major problems with this set-up.

One of the minor problems, due to the length and weight of conveyors, was evidenced by a slight whip lash effect on the down conveyors. But by changing the drive, and entry of the drive, the problem was solved. This change-over was completed without any loss of production.

Bottles Fed From Third Floor

All empties are now conveyed to the third floor. From here, gravity conveyors move the cases of non-returnable bottles to the unscrambler on the first floor, and returnable packages to the soaker on the second floor. Non-returnable packages arrive at the unscrambler with the bottles or cans in an inverted position. The men simply dump the cartons and place them on conveyors which feed the packers at the rear of the bottle shop.

Upon leaving the unscrambler, non-returnable bottles pass through a rinser, then to a 50-spout filler and crowner. From here they go through a torpedo-type pasteurizer, thence to four labelers, and finally, to the packer. Filling speed of 12-oz. bottles is approximately 235 per min., and of cans, 300 per min. When only three labelers were used, some difficulties were encountered. The fourth labeler head was installed, and this reduced the speed per unit from approximately 80 to 60 bottles per min. This licked our labeling problems, and a perfect job was accomplished.

Docks Handle 45 Cars

Final step in the expansion project was lengthening of the shipping docks. To do this, the old bottle shop had to be razed, and all docks extended through the spot originally occupied by this building. This change gave us a total of 45 car spots.

At the end of the docks, a large warehouse was built to take care of truck shipments. Openings in the warehouse permit seven trailer trucks to be loaded at one time, all under cover, and with no parts protruding over sidewalk or highway. In fact, the whole dock area is now under cover. When any of the car spots along the dock are unoccupied by railroad cars, they may be used as truck spots. Fortunately, we had the foresight to realize that increased freight rates would accent the need for handling a larger number of trucks than formerly.

Brewing Brief Scans Range of Revamping

In the "infusion method" of mashing, used in most breweries today, the *main mash*, consisting of ground malt and water, is started in the mash mixer at 95 to 122 deg. F. This malt has been carefully made from pedigreed types of barley which have been cleaned and graded with exacting care. It must be ground in such a way that the ratio of flour to coarser screenings is in proper proportion. The husks should be left as near whole as possible to form a filter-bed that will assist in later processing.

Rice, corn, corn flakes or other "adjuncts" are purchased ready for the cooker, although, in some cases, it has been found necessary to provide mills to grind the harder, refractive types of rice.

The main mash is held in the mixer for a period of 20 min. to 2 hr. During this time, proteolytic enzymes hydrolyze the higher molecular weight proteins of the malt and adjuncts. The temperature can be regulated to give the proper level of desired soluble nitrogen and insoluble protein in the finished compound. When raw adjuncts are used, they are boiled separately, after going through several holding stages at various temperatures. This is called "cooked mash."

At the end of the peptonizing time, temperature of the mash is raised, either with steam or by dropping the cooker mash, to the so-called saccharification temperature (122 to 160 deg. F.).

When conversion is complete, temperature of the mash is raised to 167 deg. F. Then the malt liquor, or wort, is removed from the grain. Generally accepted practice is to strain the wort through the false bottom of a lauter tub, or pump it through a mash filter. The wort extract is transferred to a kettle, where it is boiled and hops are added. Boiling induces many changes in the wort: It becomes sterile and more concentrated; color is increased due to caramelization of sugars; some hot-oxidation takes place; higher molecular weight proteins are precipitated; and flavor is extracted from the hops.

The wort is then cooled and pumped to fermenters, along with a measured amount of pure yeast culture. The period of fermentation, whereby the enzymes contained in the yeast split the fermentable sugars to CO_2 and alcohol, may take from five to twelve days, depending upon the product, temperature, and type of yeast that is employed.

Beer is then cooled, and transferred to the storage cellar. Here it is held for a definite period of time, depending on the composition, finished product desired, and affinity for clarification. Then the beer or ale receives its primary filtration and carbonation and goes to the finishing cellar, where blending of the various types of brews takes place. After final polishing and carbonation, the product goes to the Government cellars and subsequently to the bottle shop for filling.

A SPECIAL FOOD INDUSTRIES REPORT

CENTRALIZED CONTROL PANEL typifies strong new trend to continuous, automatic food processing.

INSTRUMENTATION

The *Plus*-Factor In Modern Food Processing

It has already brought striking rewards of uniformity—ever higher product quality, and ever lower costs—to wide-awake, pacemaking operators . . . Yet the surface of control technology has barely been scratched; the actual is but a fraction of the potential. And meanwhile that potential keeps mounting as new food processes constantly multiply the demands

LLOYD E. SLATER

Manager, Food Industry Division, Brown Instruments Division, Minneapolis-Honeywell Regulator Co., Philadelphia, Pa.

A complete upheaval in accepted food processing practices and technics has been evidenced in this postwar period. Exciting new approaches, such as vacuum concentration, ion-exchange and aseptic packaging, have evolved from the pilot plant to commercial reality. And, above all, this rapid progress by the food industries has been characterized by one general and far reaching philosophy—the trend from batch to continuous flow.

A striking parallel is evident between the growth of the chemical industries during the 1920's and the spirited activity in today's food plant.

Continuous Flow and Control

In the same way that the chemical engineers pressed their efforts to pioneer continuous processing in the chemical plants, food engineers are

Four New Processes That Are Automatically Controlled

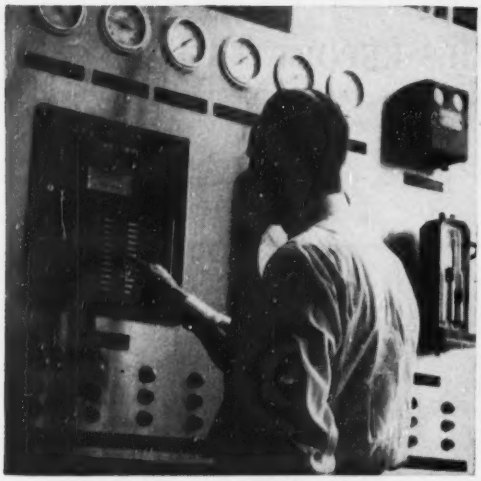


FIG. 1. PUSH OF BUTTON instantaneously brings remote juice-temperature readings onto indicator dial on panel.

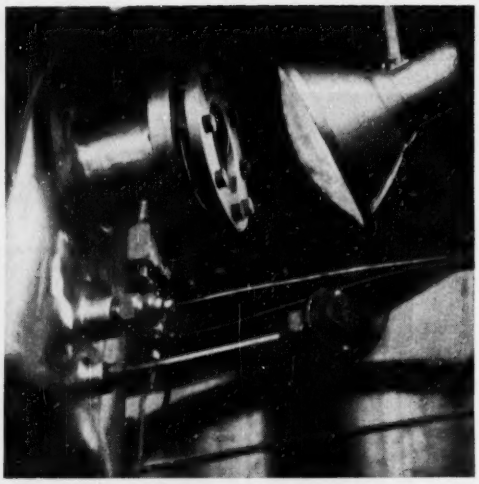


FIG. 2. SEEN HERE is lead-in of thermocouple sensing juice temperature in evaporator collector.

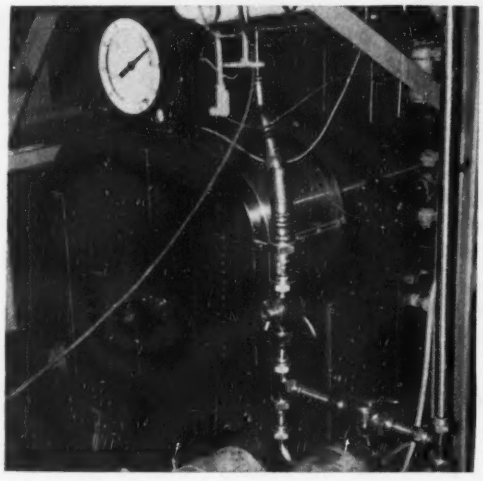


FIG. 3. THIS HIGH-SPEED heat exchanger is used for "flash" heating processes. Control is electronic.

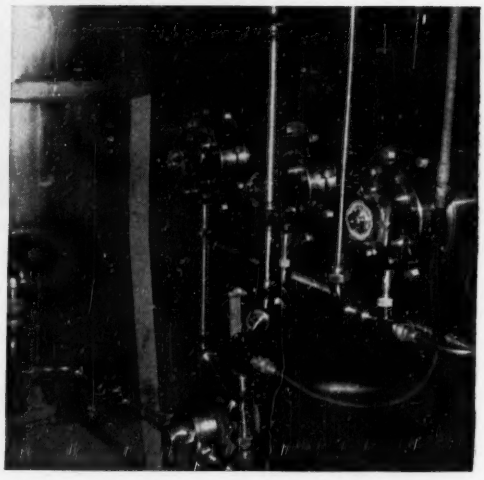


FIG. 4. LOCATION of thermocouple directly in product line speeds measurement, makes for precise control.

today feverishly at work uprooting inefficient batch and semi-continuous methods of yesteryear and substituting striking new processes which provide indisputable gains in production and quality.

Early in the development of commercial continuous-flow chemical processing, it was discovered that a carefully engineered system of automatic instrumentation was essential to assure the high standards of quality and efficiency shown possible in pilot-plant tests. Today's food processor is faced with the same problem, but he has the tremendous advantage of being able to draw upon a deep well of "know-how" offered by instrument companies. And also available is the remarkable new "tool chest" of recent instrument developments which make the controls of the '20's as archaic as the Model T of yesterday.

New Talents Needed

However, despite new and ingenious instruments, the food industry is encountering a major problem. Its engineers and technicians are familiar with the theories of batch-process instrumentation. Here, there are required only relatively simple automatic controls in a process that generally allows plenty of time for a manual adjustment of such important variables as pH, density and viscosity.

But today's continuous-process stream requires automatic-instrument technics compatible with the new swiftness of the operation. Manual or delayed measurements may result in off-grade products or damaged equipment. A whole new awareness of modern instrumentation is developing in the industry as it seeks to reap the full benefits of this science.

Knowledge of the possibilities of automatic food-process control and

familiarity with this tool therefore constitute an equation "X" that will help solve product and economic problems facing the industry. Accordingly, this report will deal with a number of cases where the equation has been solved and where this "X" factor has proved to be a plus-factor meaning undeniable gains. How new processing trends influence instrument design and application will be discussed and, conversely, how new instrument developments can direct process trends. Lastly, there will be a review of some of the latest instruments, many of which may well suggest means of dealing with the countless problems facing an industry in an era of dynamic change.

Processes Challenge Control

Outstanding among the many new concepts being studied and applied in the food process field are the vacuum operations, the higher sterilizing and and cooking temperatures for shorter duration, the chemical reactant or ion-exchange columns for purification purposes, and the "aseptic fill" processes.

All of these new techniques have created demands for versatile systems of instrument control very much different from those seen in yesterday's food plant. These new processes often are a challenge to the instrument maker (development of specific control systems for these processes will be discussed later in this report).

Vacuum Concentration

Low-temperature vacuum concentrated foods, notably fruit juices, are the most talked-of products today. And because of their ready market, the process plants to turn them out have grown like mushrooms.

The rapid emergence of this industry left many of the finer engineering details lagging, since, of necessity, instrument controls had to be developed almost overnight. The major problem is that of evaluating and controlling the end result—density of the concentrate.

Naturally, a too concentrated product meant dollar losses to the processor, whereas excessive dilution would raise the eyebrows of the Food & Drug people. Thus, the past two years have seen furious activity on the part of instrument makers to offer an in-line sanitary and functional measuring assembly for juice density which will allow an instrument adjustment of evaporation to the proper discharge value.

Another problem which came up when these new low-temperature evaporators were put on-stream was that of observing and maintaining precise temperature balances at various points throughout the process. The unusual vertical distances of the equipment made eye checking by conventional thermometers almost a feat of acrobatics. To overcome this, engineers borrowed ideas from the oil industry. They placed a central reading indicating potentiometer on the panel, in order to gather temperatures from remotely located thermocouples and so that a split-degree observation of critical temperatures could be made at the push of a button.

Much progress has also been made in recent years in the perfection of heat exchangers that allow the processing of liquid and semi-liquid foodstuffs at abnormally high temperatures—usually to the point of continuous sterilization—with little or no holding time required. While the advantages of such equipment are many, the processor often gets unexpected results because of a lack of conception of the function and need for extremely well-engineered controls.

Flash-Cooking Factors

Optimum performance from flash heating equipment usually ties in closely with running the product at the maximum capacity of the heater while successfully avoiding those conditions which cause a build-up of product solids, or "burn-on" in the heater tubes. Accurate temperature control—often to within ½ deg. F.—is needed. The instruments must be capable of rigidly confining temperature to a narrow control band despite varying conditions such as steam pressure or product flow changes.

Successful control of heat exchangers has been one of the most challenging problems facing the instrument engineer. It has necessitated much research into the theory of temperature-sensing response, and as a result totally new approaches have been developed in the construction of thermocouples and thermometer bulbs. Heat-exchanger control demanded instantaneous instrument response to temperature change; the slightest measuring lag could mean volumes of improperly heated product. Even the most refined measuring systems of a few years ago were found, on test, to be unequal to the job.

The present-day super-speed electrical sensing devices and thermal systems are as much as five times faster than their early counterparts. In this case, a vital processing problem compelled the science of temperature measurement to advance to meet new requirements. It is an excellent example of how the process industries mold and form instrument design.

The art of control valve design and sizing also has been given a boost by the persistent heat exchanger. An exact knowledge of steam line conditions and heater capabilities is needed as the basis for determining valve size and type. Too often these factors either were not known or were sketchy; and control was far from satisfactory. Valve plug characteristics and design have taken on much more meaning with these critical demands of the heat exchanger. It is now possible to fabricate a valve plug which will suit the process with mathematical certainty.

Aseptic Canning

An interesting adjunct to the evolution of improved equipment for flash heating and continuously sterilizing foods is the appearance of the integrated aseptic canning process which logically takes the sterile product from these heaters and places it in equally sterile containers under bacteria-free filling conditions. While such an idea is startlingly simple and the possible benefits are far-reaching, the actual commercial execution involves fairly complex engineering problems, both from the standpoint of filler design and control instrumentation.

Prime objective of instrumentation in an aseptic canning process can be summed up in one word—*safeguarding*. Every vital temperature in both product and container sterilizer lines, and at the filler, must be automatically maintained as a lethal barrier to bacteria. And if and when one of these temperatures should get out of hand, a complex safety system should be inaugurated and supervised by instruments which will not allow contaminated products or containers to reach the finished pallet, and which will not allow a pile-up in the various branches of this integrated "assembly-line" canning operation.

So the very nature of aseptic canning commits it to the control-panel type of operation. Called in to aid in the layout of this master panel is the instrument engineer—his is the "know-how" required on the instrument interlocks and relays and timers. In no other complete food process has instrumentation assumed such great responsibility.

Ion-Exchange

The somewhat revolutionary technic of measuring product or material qualities, such as pH, density, concentration, etc., in the actual process stream has seen only limited usage in food processing. However, with the new science of ion-exchange gaining wide application, such technics must of necessity become part of the general approach to instrumentation.

Successful continuous operation and automatic interchange of "ionic columns" relies upon an in-stream measurement of fluid qualities, and the commercial operation is dotted with such relatively unfamiliar measuring

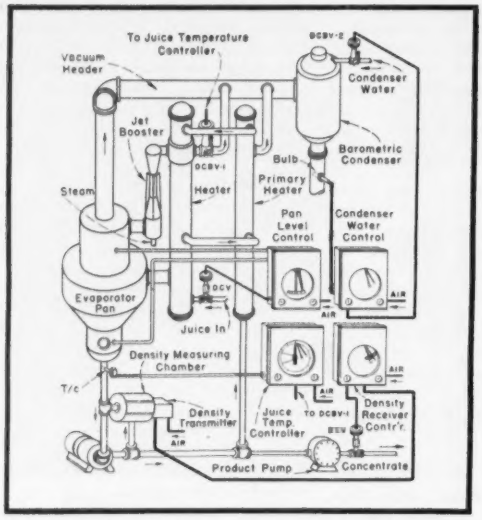


FIG. 5. **CITRUS JUICE** density, temperature, pan level, and condenser water are regulated in concentrator.

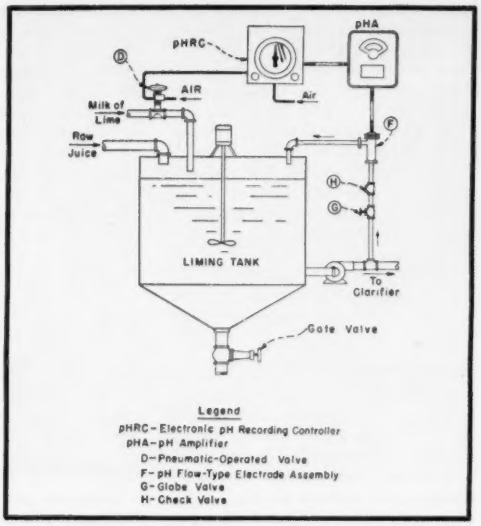


FIG. 6. **SUGAR CANE JUICE** in liming tank is automatically adjusted for pH by action of control instrument.

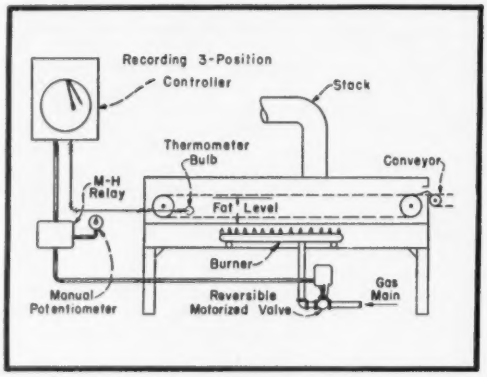


FIG. 7. **DEEP FAT** continuous fryer has its electric control thermometer bulb located at feed end of unit.

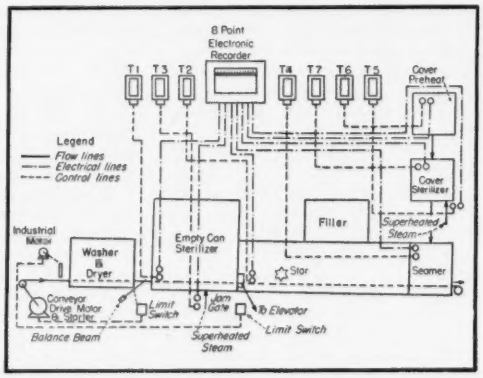


FIG. 8. **ASEPTIC CANNING** system incorporates controls at both can sterilizer and filler sections.

devices as pH electrodes, conductivity cells, density pick-ups and even colorimeters.

Using the sugar process for an example, we can easily see the necessity for these new types of measurement. To keep the untreated sugar solution in continuous motion, an automatic determination of the "sweetening-on" and "sweetening-off" phases of exchange cell operation must be made. This means that, when the impure solution is directed to a regenerated cation cell, some measurement must automatically "tell" a control instrument to send this stream to the anion column when the water in the cation cell has been sufficiently replaced by sugar liquor to be "sweetened on." A continuous measurement of liquor density as it leaves the cell will determine when this point is reached—density being proportional to the amount of sucrose in the solution.

By the same token it is necessary to know when an exchange cell has been used up, or "sweetened off," so that the sugar solution can automatically be directed to a new or regenerated column. Obviously, a density measurement would be of no use here, since the increasing impurities in the treated solution have no appreciable effect upon its specific gravity. The conductivity cell is employed at this point to directly detect a build-up of mineral impurities.

Washing and regeneration of spent cells provide us an equal problem of measurement and control. Rinsing requirements can be kept to a minimum by automatic colorimetric determination of rinse clarity. In addition, direct pH measurement enables keeping expensive chemical regenerants to a minimum.

In addition to the very sophisticated measuring problems posed by ion-exchange systems, the actual mechanics of automatically controlling the system provide a fair amount of intricacies. Automatically operated transfer valves are fitted, in an elaborate network, throughout the system piping. The instrument "set-point" is placed at the optimum value which corresponds to whatever function is

involved—such as "sweetening-off," etc. When that point is reached, an electric contact in the instrument actuates the transfer valve to re-direct the process stream. Complete continuousness thus depends upon a highly integrated system of automatic control valves and a completely centralized panel control system.

Process Creates the Instrument

New instruments are conceived and developed through the pressure of many agencies. Probably the most dramatic and forceful means of "extricating" such new items from the shops of the instrument maker is the persistent demand of a process.

Two examples are found in the old process of cane sugar liming and the new science of food concentration. The former process, on the brink of becoming efficiently continuous, needed a rugged and responsive "in-line" pH pick-up. Food concentration men, from the start, had been dissatisfied with conventional systems of density measurement and wanted something new and simple to cope with this difficult determination.

Both processes could undoubtedly have struggled along with un-functional equipment which was available, but we should be grateful that the process engineers persistently requested the "right thing for the job." As a result, both the process and the science of instrumentation have advanced.

Low-Temperature Evaporation

The first commercial operation for the high-vacuum or low-temperature evaporation of fruit juices has been in existence for slightly more than two years. Yet this new process already has had amazing repercussions on instrument design and application. Conventional evaporator control systems were found to be inadequate because of the high-speed nature of the process and the unusual thermodynamics involved. Also, this process represented one of the first major demands for a sanitary approach to such sophisticated measurements as flow, density and throttling of liquid level.

How some of these problems were solved in the instrumentation of one type of evaporator is illustrated in Fig. 5. The liquid level of juice in the pan bottom is measured by means of a new "dry-type" manometer which employs an air-purge system to keep product out of its stainless steel sensing bellows. This instrument controls the feed to the pan through a pneumatically throttled Saunders type valve. It is interesting to note that all control valves which pass juice or concentrate are of this self-cleaning rubber-seated type. The sensitivity and ability of this type of level measurement is evidenced by the fact that only a tiny fraction of the juice in the system is actually in the pan bottom—this in the form of a violent vortex being successfully measured and controlled.

Regulation of juice temperature—a vital function where an excess degree or two may give the product a "cooked" flavor—is accomplished through a high-speed electronic controller which measures through a sanitary thermocouple in the pipe-line connection. This instrument regulates the circulation of vapors in the by-pass line to the vacuum header.

The greatest achievement of the control system, however, is the action of the continuous in-line density controller, specifically developed for this process. This unit actually passes a continuous parallel stream of the concentrate through its measuring chamber and provides a consistent control to within ½ deg. Brix by regulating the amount of finished product being drawn off from the system.

Continuous Sugar Liming

Until recent years, the amount of lime to be added to the acid juice from cane was determined through indicator test papers—a method not only slow but subject to many errors. The development of the laboratory-type glass electrode, and its associated manual balance indicator, was a remarkable advance for precision control of this operation—for thus salt and protein errors were eliminated completely and accuracies were possible to within .1 pH. However, this new method also required sampling, and it was still necessary to confine the addition of lime on a batch-quantity basis.

Two recent advances in instrumentation now make feasible a continuous system of liming. These are (1) the evolution of the glass electrode to its present rugged design, allowing actual pipe-line connection without fear of damage; and (2) the "continuous balance" type of potentiometer providing a running measurement of glass electrode values, coupled with constant control action.

Fig. 6 illustrates a typical hook-up for continuous liming control. The flow-type electrode assembly is installed in a by-pass line to the clarifier, directly downstream from the pump—thus assuring a uniform and representative sample of treated juice. In accordance with pH, the electronic controller pneumatically adjusts a Saunders type valve that proportions the exact amount of lime slurry flow needed to neutralize the liquor. In this manner, optimum conditions are automatically maintained for the removal of impurities, and lime consumption is kept to a minimum.

In a manually controlled continuous-flow operation, a slight lapse in judgment or watchfulness can, through damaged product, make the process unfeasible. This is especially true in those processes involving the pasteurization or sterilization of foodstuffs.

The automatic control of such processes often brings them into the realm of safe and profitable operation. The recently developed continuous deep-fat frying and the aseptic-fill process are examples. The former, while a working vision for years, emerged as a successful operation only when the proper controls were available to integrate into the fryer design. The latter process, appearing recently in commercial form, was conceived and designed with controls as part and parcel of the process, and it represents an excellent example of the "safety" type function of instruments.

Uninterrupted Frying

While continuous frying merely involves a mechanical means of moving a constant stream of product through a hot fat bath, the design of such equipment presented a knotty engineering problem. Early experiments usually ended with a soggy product and burned tubes. But recent improvements in immersion heating, coupled with an advanced type of electronic control, provided clues. Thus, well engineered and successful continuous-frying equipment is now on the market and being used for an increasing list of diverse products, such as fish fillets, hamburgers and corn niblets.

The system illustrated in Fig. 7 shows the control arrangement for a gas-fired continuous fryer. The temperature-sensitive bulb is at the feed end of the unit so that bath temperature is maintained at the point of greatest load change. If fluctuations occur here, the product will become soggy and burned. The motorized valve on the gas main is controlled through pre-set electronic control units in the instrument. A manual potentiometer is integrated into the control circuit so that the position of the motorized gas valve can be set to suit a particular load or product.

Aseptic Fill Process

Although simple in theory, continuous sterilization of a foodstuff and its filling, under aseptic conditions, into sterile containers is revolutionary in its influence on food processing. This drastic statement is based upon the fact that an almost uncanny system of safety controls has been incorporated in at least one of the commercial aseptic processes now being tried in the field. And because of these controls, results from this operation can *only be positive.*

How Instruments Revitalize Old Methods

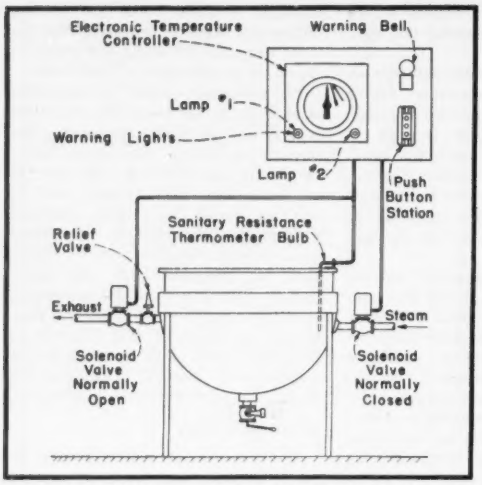


FIG. 9. COOKING temperatures of food materials in vessel are regulated by instrument control of steam.

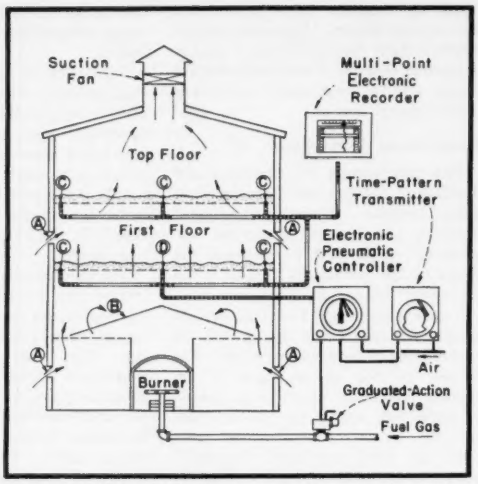


FIG. 10. MALT DRYING control diagram shows (A) louvers, (B) mixing hood, (C) and (D) thermocouples.

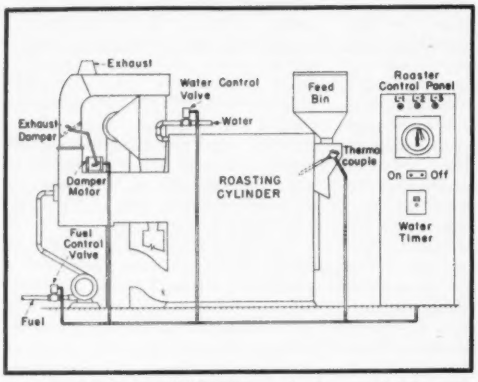


FIG. 11. COFFEE ROASTING cycle is completely automatic under this "pushbutton" control system.

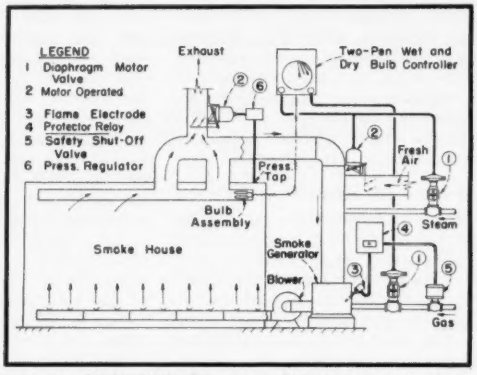


FIG. 12. SMOKEHOUSE air-conditioning layout shows bulb-assembly location and control connections.

In other words, to even fill a container and thereby get production, conditions in the aseptic process must satisfy the fixed standards of the controllers—standards which guarantee more than optimum aseptic conditions through all phases of the process line.

Inasmuch as the container sterilizer and filler are the unusual parts of the process, the instrumentation of this section is illustrated in detail in Fig. 8. A master multi-point electronic recording controller reads temperatures from thermocouples which are located at strategic points throughout the operation. Paralleling these thermocouples are bulbs of non-indicating controllers which tie into an intricate system of warning lights at the panel and also maintain vital temperatures.

A "push-button" operation at the panel initiates the can sterilizing process and brings the filler up to the proper conditions, but none of the product is allowed to go forward to the filler until temperature conditions are satisfied at the product container, and filler sections of the process. If, during operations, any vital temperatures fall below their set values, the process will automatically be switched to water run and cans are stoppped.

Old Methods Revitalized

Many standard and accepted unit operations in the food industry have in recent years been contested by new concepts of doing the same job, or have been forced into the light of crudity when compared to more polished and less costly methods of processing foods in other branches of the industry. Most batch operations fall into this category—they appear uneconomic when contrasted with doing the same job continuously.

However, many processors have been forced to retain their batch equipment, either because no other way has yet been developed to do the work, or because of the capital investment required to replace such equipment in favor of continuous machinery. The past few years have seen a partial reclaiming or revitalizing of many of these processes through imaginative use of modern instrumentation. A few examples follow:

Open-Kettle Cooking

Consider, for instance, the simple steam-jacketed cooking kettle that is still the most universal piece of proc-

ess equipment in the food industry. Many processors overlook the amazing results which are possible through improved technics in the control of this kettle.

The majority of kettle processes merely involve the evaporation of water from a solution to make a product of definite concentration. This concentration, especially where sugar solutions are involved, is usually closely related to an equally definite boiling temperature. The improved technics involve the use of high-speed, precise electronic temperature controllers to terminate the cook. In preserve manufacture, for example, it is possible to automatically boil to within ½ deg. Balling, whereas the closest manual control is subject to a 2 deg. Balling error with a sampling refractometer. In terms of product yield, this error can run to as much as $50 per average kettle per day.

Fig. 9 indicates the simplicity of this application. A high-speed stainless steel-encased resistance bulb is immersed in the kettle contents and, in conjunction with an electronic recorder, is capable of following true temperature development to within ¼ deg. F. Kettle shutdown at a precise end-temperature is accomplished through the automatic closure of a solenoid valve on the steam line and the equally instantaneous exhaust of the steam jacket through an additional fast-opening solenoid. It is possible to initiate a complete and fairly complex cooking sequence by a push button. An attendant is required only for filling and dumping the kettle.

Coffee Roasting

Dating back more than 100 years, commercial coffee roasting has always relied upon a skilled attendant's estimation of bean color to end the roast. While this measurement is an undeniably good index of proper roasting, such a determination is always subject to the vagaries of the human eye.

Recent application of the war-evolved electronic temperature controller to the roaster has substituted a sensitive tip thermocouple as the measuring agent, with a subsequent almost uncanny correlation of bean color with temperature. A natural evolution from this precise measurement is the unique system of automatic control used on many roasters today, providing a mechanized means for duplicated results from roast to roast.

In Fig. 11, bean temperature is shown being sensed through a thermocouple which is intimately in contact with the batch. At the precise end-point, which has been correlated with color, a contact in the instrument causes automatic shutdown of firing and damper opening. At the same time, a water spray is initiated for a timed period, effectively retarding further temperature development of the beans. At the end of the timed period a light flashes, indicating the roast is ready to dump. This automatic sequence has been shown to provide as much as one more full roast per hour.

Meat Smoking

Recent advances in smoke house design have done much to improve the technology of this process and allow the application of modern instrumentation to a much greater extent than in the old hickory-fire type of structure. The modern air-conditioned type of smokehouse, with its duct system and compact conditioning and smoke generating unit, provides a "custom made" setting for control and its benefits.

Precise instrument regulation of air temperature and humidity in the smokehouse provides a number of advantages. Higher temperatures can be used safely, allowing drying and smoking in one operation and decreasing processing time with an estimated average saving of from 1 to 3 percent in shrinkage. Control of humidity during smoking prevents moisture deposition on the meat—averts resultant bitter taste and weakening of casing walls. Proper regulation of the drying rate allows a minimum shrinkage without the danger of excessively hardening meat surface.

A typical control installation is shown in Fig. 12. Both the wet and the dry bulb from the controller are located in the return air duct, thereby effectively measuring what has happened to the air in its continuous circulation over the meat. The dry bulb controller throttles the gas flow to the burner to maintain the smokehouse at the desired temperature—as pre-set on the instrument. The wet bulb reading performs a dual function in that it allows the controller to open the steam humidifying valve whenever humidity conditions fall below optimum, while closing the inlet air damper.

The steam valve will close when humidity rises and the damper will open to admit fresh air which will have a low humidity when heated. An additional device in the system is a static pressure regulator which opens a damper in the exhaust line when pressures in the smokehouse become excessive.

Malt Drying

Proper kiln drying of germinated barley malt represents a fine balance between time and temperature. The experienced maltster, by careful supervision and manipulation of burners and dampers, can develop various types of malt suitable for lager, prager, or pilsner beer, depending upon this time-temperature relationship. Recent advances in electronic control now place this critical and closely watched process on an automatic basis, with very little supervision required and remarkably uniform results in the final malt.

An instrumentized malt kiln is illustrated in Fig. 10. Thermocouples, located throughout the beds of green malt, transmit temperature readings to both a multiple electronic recorder and a master controller. In the multi-story kiln illustrated, primary drying is given to the malt in the upper bed, with a complete graph of temperatures allowing close adherence to a set time-temperature schedule. This partially dried malt is transferred to the lower floor, where a finishing drying takes place at an elevated and critical temperature. In this bed, a "control" thermocouple allows the electronic controller to regulate the amount of fuel gas being admitted to the burners.

To automatically follow a predetermined time-temperature schedule for the particular malt type being dried, an additional instrument, used in conjunction with the controller, is employed. It contains a clock rotated aluminum cam cut to the shape of the desired temperature curve. A rider on this cam mechanically allows a transmission of air pressure to position the index in the controller.

Deviation of this index away from the recorder pen causes a movement of the control valve in accordance with the drying schedule. Various cams can be cut for different schedules, and these are interchangeable in the instrument. Maltsters have found that particular cams, developed to suit the specification of particular customers, provide an excellent specialized customer service.

Integrated Instrumentation

The application of instruments to a process often will not fit the simple standard formula of: "Select a variable . . . measure it . . . and then control it." Frequently, the many variables interact upon one another to produce a combined effect, and the instrumentation must be suitably designed and interlocked to produce a state of balance between these factors. Such blending of instrumentation can be called integrated control.

These systems represent a collaboration between the process engineer and the instrument application engineer. Since the advent of continuous processing methods, such cooperation has, of necessity, become more and more frequent. A few examples of the labors of these engineers, typical of

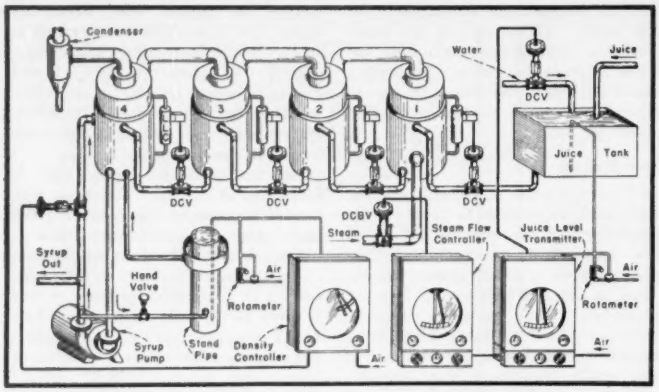


FIG. 13. SUGAR EVAPORATOR (multiple effect) is diagrammed to show how instruments are hooked-up to control integrated process variables.

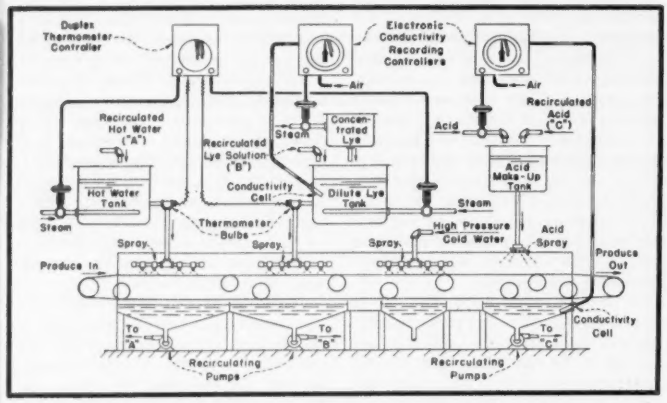


FIG. 14. IN LYE PEELING, temperature and concentration of spray must be regulated. Diagram shows type and location of sensing elements.

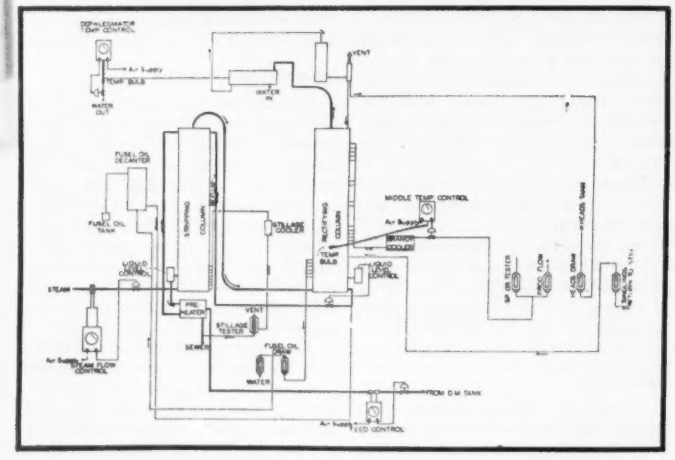


FIG. 15. DISTILLING instrumentation diagram for two-column brandy still illustrates how integrated variables are automatically supervised.

the many engineered and panelled control systems that have appeared since the war, include sugar evaporator control, lye peeling control, and brandy still control.

Sugar Evaporator Control

Regardless of the number of effects, evaporator control involves one fundamental problem—that of proportioning the amount of steam supplied to the evaporator to the quantity of water that must be evaporated from the juice in order that a uniform syrup may leave the last effect. A most important variable is the flow of juice, especially in sugar mills where grinding must be subject to wide fluctuations because of difficulties arising from mechanical harvesting.

Conditions are further complicated in those plants where the evaporation is carried on entirely by exhaust steam, with resulting variations in steam pressure. Experience has shown that no single controller, basing its operation on density of syrup leaving the last effect, can adequately compensate for all the variables affecting the process.

In designing an integrated control system for an evaporator, it is first necessary to keep the rate at which the juice flows through the process within the range of the evaporating ability of available steam. The illustrated system in Fig. 13 accomplishes this objective by assuring that the syrup will always leave the last effect at a constant density. If this syrup is too dilute for the available steam, the flow of juice through the evaporator is slowed until its movement is no faster than needed for proper evaporation.

Juice level in the supply tank, a function of juice flow to the process, is gaged by means of a hydrostatic air column. This measurement is transmitted to move the set-index of a steam flow controller so that more or less steam will be admitted to the first effect, through the automatic butterfly type valve, as the juice supply increases or decreases. An additional function of the transmitter is to open a valve in the water line to the thin juice tank so that evaporation will continue at those times when juice supply is too slow.

Syrup Brix is determined by a density controller which measures through a constant head standpipe of syrup by means of a continuous bleed-air bubbler system. Should the syrup density fall below a set value, a control valve opens and allows the syrup to circulate back into the last effect. The resulting increase in level causes the level controller on this effect to cut off the flow of juice from the preceding effect. A slight rise in level in each effect will therefore result in a stoppage of the entire juice flow to

the evaporator, until the syrup has again reached the proper density. At this point, the by-pass valve will again close and allow the syrup to flow to the syrup tank, restoring the normal flow of juice to the evaporator.

Lye Peeling Control

Many processors shy away from lye peeling because of reputed high product losses in this process. Recent instrument developments, however, can simulate the technology which must accompany a successful lye peeling operation and should do much to encourage a more widespread use of this economical peeling method.

Lye peeling instrumentation provides an integrated approach to a somewhat complex set of variables. Proper peeling is dependent upon the strength and temperature of the lye bath, the time of product immersion, and the efficacy of the rinsing to halt the lye's penetration. If the lye is too hot, strong, or lengthily applied, peeling losses will be excessive. And if conditions are reversed, spotty peeling will occur. Such a set of conditions necessitates the maintenance of a fine balance between all factors—a fairly complex but practicable job for instrumentation, but an almost superhuman task for the average cannery attendant.

In the illustrated system, Fig. 14, lye concentration is measured and controlled continuously by means of a conductivity cell located in the dilute lye tank, working in conjunction with an electronic conductivity controller. The latter, through steam valve action, melts or dissolves the solid flake lye feeding the dilute tank. Lye temperature is controlled through a thermometer bulb measurement in the pipe line leading from dilute tank to spray, a control valve being positioned on the steam heating line to the lye tank. The same thermometer controller, through an additional self-contained measuring system, also regulates the temperature of the preliminary hot water spray.

Following a high-pressure cold water spray, which may not fully arrest lye action on some products, an additional dilute acid rinse may be given. Rinse strength is automatically controlled through a conductivity cell in the spent rinse, allowing the controller to position a valve in the concentrated acid supply line in accordance with rinse demands.

Brandy Still Control

Keen competition and low marginal profit in the wine industry in recent years has fostered intensified efforts to improve brandy-still efficiency and through-put. In pursuit of this objective, a number of wineries have drawn on the experience of their high-proof cousins—automatic control having been part of efficient whiskey production for many years.

A typical two-column brandy distilling unit and its instrumentation is shown in Fig. 15. A manometer-type flow-meter measures feed through a venturi and controls pomace flow to the still through a Saunders type valve, allowing a fixed and optimum rate of flow for different kinds of distilling material. A similar controller regulates steam supply to the still, an orifice plate being used as the primary measuring device, and a V-port type control valve being utilized, since clogging is not a problem here. Such steam flow control provides optimum distilling rates for different materials and different reflux ratios.

A recording temperature controller, regulating the amount of discharge water from the dephlegmator, is shown with its bulb installed in this stream. In this manner, a discharge temperature is maintained which is compatible with optimum condenser efficiency. A similar controller, used to keep a constant temperature in the fusel oil band of the rectifying column, has its bulb carefully located at the "breakpoint" (that point at which there is a maximum temperature difference between plates). This instrument controls the amount of brandy draw-off through a valve located on the downstream side of the brandy cooler.

To complete the integrated control system, a level control is installed at the base of the rectifying column, providing a uniform flow of reflux back to the stripping column through the action of a valve on the discharge side of the reflux pump. This effectively

Elevators Covered

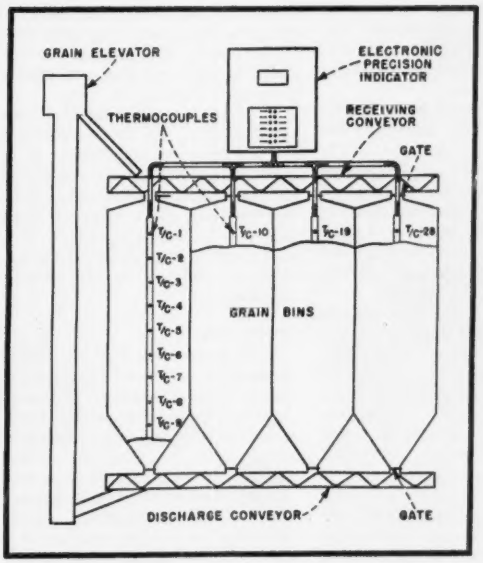


FIG. 16. IN STORAGE ELEVATORS, thermocouples (T/C) sense temperatures for reading on instrument board.

Speedy Reading

FIG. 17. REFRIGERATION ENGINEER can check fruit chill-room temperatures without leaving his car.

Sanitary Details Are Stressed

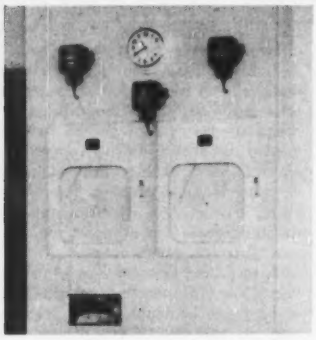


FIG. 18. CASE design stressing sanitation is epitomized in this unit.

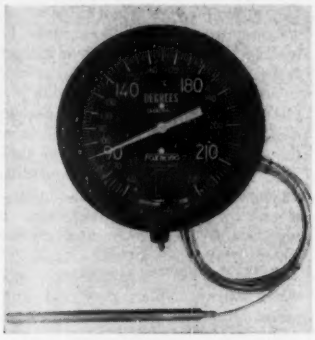


FIG. 19. SMOOTH stainless steel is used in this thermal tubing.

FIG. 20. FOR PIPE connections, this sanitary thermal bulb is employed.

prevents intermittent reflux return, which can cause major losses from upset still equilibrium. In addition, five indicating rotameters are installed as valuable guides to the operation. Product proof is determined continuously by a specific gravity tester.

New Tools for Quality

Postwar instrumentation has not confined itself exclusively to process control. Many applications have appeared in both the preprocessing as well as storage and shipping phases of food handling. Practically all of these instrument applications originated through the experimental efforts of a progressive member of the industry who believed that the same standards of quality protection should exist all down the line, from field to consumer—not alone in the plant.

Most of the quality-control type of instrumentation applied has involved the use of improved temperature reading and controlling systems—a logical concession to the thermo-liable nature of food materials. However, humidity, air composition, and other factors which influence the quality of food, are also receiving study, and instrument systems involving this type of measurement are appearing in many plants.

The two following examples deal with the urgent problem of quality losses in storage and transportation. They typify recent achievements.

Grain Bin Storage

Millions of dollars worth of grain are lost each year because of improper storage-temperature supervision. Partially burned or moldy grain, resulting from such faulty storage, means loss of top-quality price and increased cost of handling.

Many progressive millers and grain terminal operators have recognized this as a tangible problem. They have installed some sort of system of temperature reading throughout the storage bins which allows periodic and rapid scanning of temperatures at definite levels in the grain.

In the past few years, modern high-speed electronic systems have been developed and installed for such work. And now, in a matter of minutes, an attendant can rapidly survey as many as 1,000 remotely located temperature points to within ½ deg. F. A vast network of electric wires fanning out into the bins from the single instrument panel makes this possible.

At the present date, new methods are being developed which will make such temperature surveys completely automatic and periodic. A motor driven "scanner" will whirl through an unlimited number of temperature points in a matter of seconds. Any point which is abnormal or "out of line" will instantly cause a relay to energize, thereby sounding an alarm and automatically initiating a recording mechanism which will identify the point and keep track of its temperature development.

Noticeably improved standards in the general excellence and quality of processed foods in recent years has caused the consuming public to look for equally high standards in fresh produce. Recognizing this, many raw fruit and vegetable packers and shippers are devoting the same kind of engineering attention to quality control measures as they normally would if they were heat-treating, or blending, or mixing their product.

Fruit Chilling Control

An interesting control measure is applied by one large western fruit packing organization in its efforts to place a premium product before the consumer. These people employ mechanical refrigeration in the pre-cooling they give to fruit prior to ice-refrigerated shipment to the East. In the transcontinental haul, they know full well that their product may be held, but never brought down in temperature while in the car. They therefore impart a maximum chill to the fruit before shipment and, through this practice, manage to command a noticeably higher price on the eastern market due to low quality losses in shipment.

The automatic control of these fruit chilling rooms is the secret of this measure. Electronic recording controllers are used to maintain the chill room to within ½ deg. F., with laboratory precision, by regulating the circulation of refrigerant through the room by means of a back-pressure control valve. Several thermocouples are located throughout the room, and the instrument can thus be switched to control from the area harboring fruit when the room is partially filled. In this manner, it is possible to impart a chill to fruit to within a fraction of a degree of freezing its tissue.

All control instruments are located out-of-doors on the loading platforms of the various packing houses of this organization. Thus, one man, traveling from plant to plant in the course of a day, can check this vital operation directly from the window of his car by noting the readings of the large indicating pointers in the electronic instruments.

Sanitary Design

Food processors have the job of instrument selection simplified for them considerably because of the sanitary aspects of their work. Certain instrument designs are obviously unsuited to the handling of foodstuffs, due to the difficulties of cleaning or the possibilities of contamination. In view of this, the sanitary aspect is receiving the proper attention it deserves on the design boards.

Instrument case design has been up for review, and at least one company

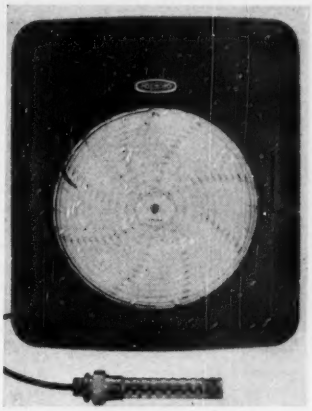


FIG. 21. **HUMIDITY** and temperature are measured directly by this unit.

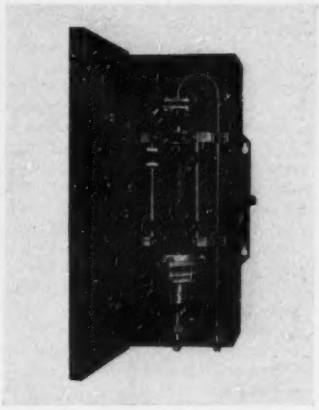


FIG. 22. **DENSITY** of liquid is accurately gaged by this element.

FIG. 23. **FLOW** measurement in pipe lines is provided by this cell.

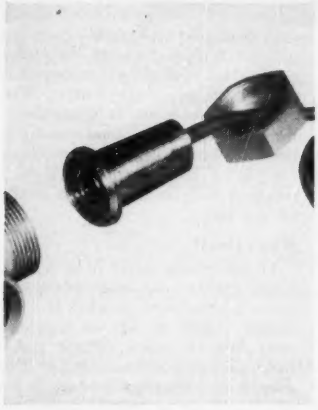


FIG. 24. **PRESSURE** element utilizes strain-gage measurement principle.

FIG. 25. **pH VALUES** of the flowing liquids are determined by this element.

FIG. 26. **DISSOLVED** electrolytes are evaluated by this conductivity cell.

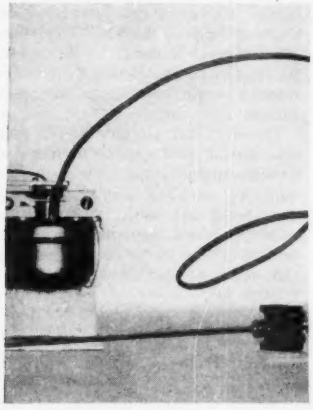


FIG. 27. **IN AGITATOR** vessels, this unit determines temperatures.

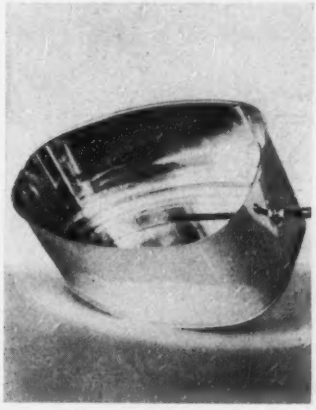


FIG. 28. **THIS UNIT** gages food temperatures in pressure-tight cans.

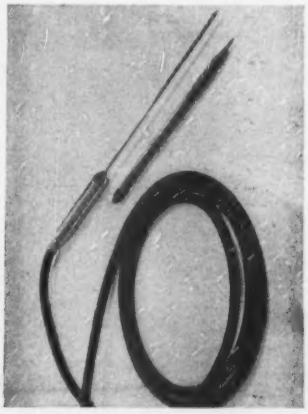


FIG. 29. **MEAT-STICKING** thermocouple relays inner readings.

has re-issued its whole recorder-case line with the proper rounded contours and lack of cracks, in keeping with in-plant sanitation. Stainless steel in instrument doors and cases has also been advocated and is slowly being released to the industry.

Sanitary measuring-element design has also considerably improved in recent years. The 3A Standards of Dairy have been applied to thermocouples and resistance bulbs, as well as thermometers and pressure connections. Tubing and wire connections, from instrument to bulb, are now available in smooth stainless steel and rugged seamless rubber.

New Instrument Types

While basic instrument modifications have been many, relatively few completely unorthodox and revolutionary instrument types have appeared over the years. Perhaps the most revolutionary concept developed has been the electronic type instrument which substitutes vacuum tubes and servomotors for mechanical measurement. This basic electronic concept has provided the means for an almost unlimited number of new continuous measurements, from simple humidity to mass spectrometry. A recent innovation in the electronic type is a round chart multiple recorder which utilizes an unusual magnetic method for changing print numbers.

Great advances have been made in the integration of instrument components. Most companies offer built-in time control in both pressure and temperature instruments—an excellent tool for batch processes. A non-indicating "unitized" controller, evolved from various separate components, provides an electrically powered, self-contained control system action with great precision and power.

New offshoots of established instrument types have appeared. A compact filled-system type temperature measuring unit has been developed for "at-the-process" mounting, with readings being pneumatically transmitted to remotely located recorders and controllers. Remarkable sensitivity, narrower spans, and easily adjusted ranges are featured in this system. A non-mercury, or "dry"-type, manometer has been created by a number of instrument companies, thus eliminating the contaminating aspects and bulkiness of the conventional mercury meter-body. One company has designed this as a separate and compact unit, apart from the recorder, so that it can be conveniently mounted directly at the process—thus eliminating long reaches of manifold piping.

Probably the most remarkable achievement of postwar instrument technology has been the evolution of the sensing element concept. This new theory of measurement relies upon the basic fact that most variables can be converted into an electrical signal of a definite quantitative value. This signal, which will change in magnitude with fluctuations of the variable, is fed into the input circuit of an electronic recording controller and changed into a calibrated pen movement.

The mechanics of converting a physical or chemical condition, as represented by the variable, into an electric signal can be spoken of as electric sensing element design. Some familiar examples of elements of this type are the glass electrode, the conductivity cell, and the dew cell, which measure pH, solution conductivity, and humidity, respectively. Another fairly new electrical sensing element with great application possibilities is the strain-gage. This unit provides a direct conversion of pressure and/or force into a measurable electrical quantity and, by dint of the versatility of its physical design, can be used in such work as continuous weighing and even differential pressure or flow measurement. There recently appeared a sanitary version of the strain gage that holds much promise in liquid food storage and handling.

The functional design of the more common sensing elements has also progressed. Thermocouples have been evolved for specific applications, such as in-can measurements and food dunking and piercing use. An excellent example of this latter type is the ham-sticking thermocouple, which makes possible a continuous control of internal meat temperature during processing.

Design technics have appeared to take care of difficult element-mounting problems. Agitated process vessels, which normally resist the physical mounting of temperature measuring devices, can now be attacked through two approaches. A rotating or commutator type pickup can be used in conjunction with the thermocouple actually rotating in the kettle. Where even this approach is impossible, a fairly representative measurement can be obtained through a skin-type, or "button", thermocouple which is mounted flush with the inner surface of the vessel.

What's Ahead?

To tell what's ahead in new instruments for the food industry would involve a knowledge of what is on the design boards of all the instrument companies—a rather difficult task in this highly competitive industry. However, it is usually pretty easy to gage what we'll see by what is needed now.

More flexible sanitary flow measurement and continuous, accurate, flow totalizing can be predicted on this basis. Moreover, inexpensive non-indicating types of electronic controllers should appear in answer to the demand for flexibility of electrical measurement in simple, low-temperature applications.

Compact and sanitary in-line units also should soon appear for the continuous measurement of food-product qualities, such as density, viscosity, consistency and color. And more and more "package" type control systems will be offered to the food industry as the complete instrumentation for a specific job.

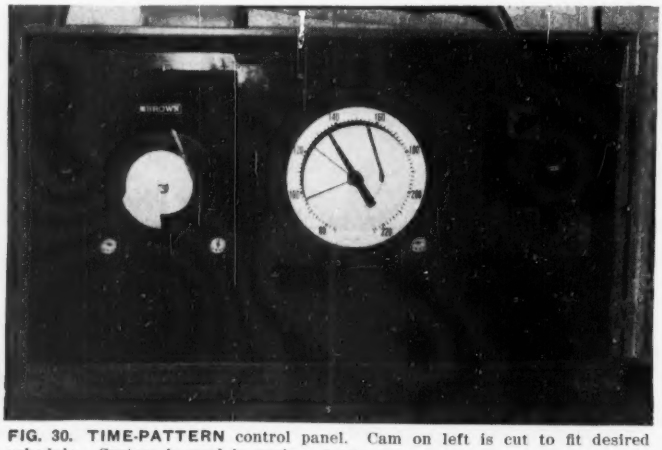
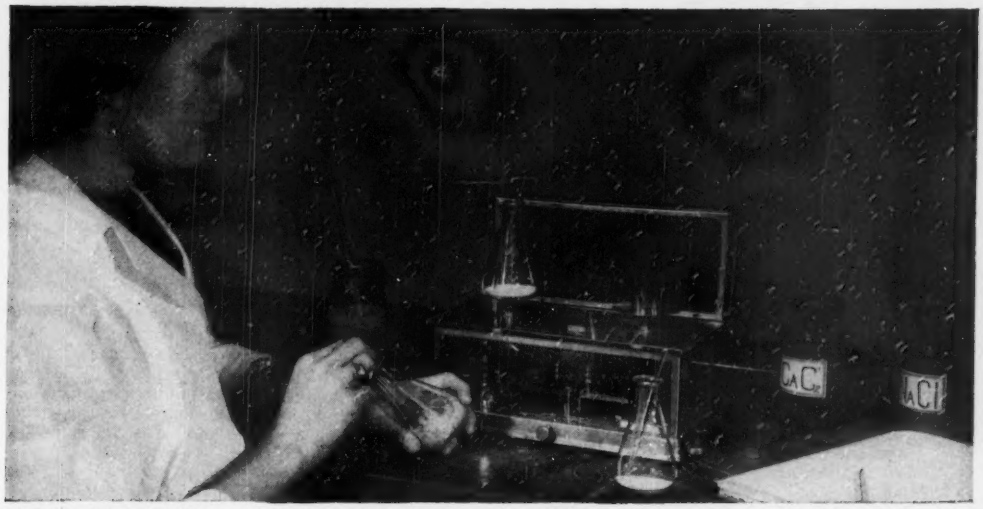


FIG. 30. TIME-PATTERN control panel. Cam on left is cut to fit desired schedule. System is used in various food processes.

Illustration Credits: Lead photo, Joseph E. Seagram & Sons; Figs. 1, 2, Real Gold Citrus Products; 3, 4, Curtis Bros. Packing Co.; 5 through 17, and 20, 27, 29, Brown Instruments Div., Minneapolis-Honeywell Regulator Co.; 18, Bristol Co.; 19, 21, 23, Foxboro Co.; 22, Precision Thermometer Co.; 24, Statham Engineering Co.; 25, National Technical Laboratories; 26, Industrial Instruments Co.; 28, O. F. Ecklund.

Technician Shows How It's Done



SAMPLE OF PREPARED KERNELS is (1) throughly mixed with salt—as seen here in pre-weighed flask. Then (2), flask is again weighed; (3) contents are reacted with known amount of calcium carbide, and (4), flask is re-weighed, after cooling. Percentage of water is now readily calculated, thus completing this—

Quick Test of Sweet Corn Quality

Simple carbide reaction gages moisture content—which is reliable maturity index, both for processing in-stock corn and for harvesting on-stalk ears

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A rapid, accurate test for finding the moisture content of sweet corn—and thereby gaging its maturity—has been recently developed. This new procedure is an adaptation of the weight-loss procedure used for cheese, wherein calcium carbide reacts quantitatively with the water.

The moisture content of corn has long been recommended as a reliable index of maturity[1,2,3,4,5,6]—moisture being a primary factor in the quality of the processed product. However, no such gage has yet come into common usage. And the need for it becomes emphasized. It would be especially helpful in estimating the proper harvest time and in checking on the condition of the raw stock in the processing plant.

However, up to this time, moisture determinations have been either too time consuming, too costly, or not suitable for "wet" materials.

One processing plant reports that a distillation method for determining moisture in sweet corn has proved useful in segregating lots of like maturity[3]. Others have tried oven-drying, the Fischer titration determination, or use of electrical moisture meters. In any case, the index, as related to maturity had to be determined for each variety of corn.[2,5,7].

Now, this weight-loss method gives promise of affording a quick, inexpensive, and accurate determination applicable for all varieties. In fact, the results achieved have agreed within ± 1 percent with those obtained by a vacuum oven method.

In developing the calcium carbide weight-loss method, frozen samples of corn were first brought to room temperature. Then two modes of preparation were employed: (A) Samples were ground in an intermediate Wiley-type mill to pass a 20-mesh sieve; (B) Samples were blended with 15.0 percent added water (15g. of water put in for each 100g. of sample) in a Waring Blendor. The added water was then taken into account in the calculations of the original moisture.

Next, a 125 ml. Erlenmeyer flask, containing about 5g. of dry C.P. salt (NaCl) and a glass stirring rod, was weighed. About 1.5-2.5g. of the prepared corn was added and mixed thoroughly with the salt. The flask and contents were again weighed to ascertain the weight of the corn sample.

Then, an accurately weighed amount (about 5g.) of calcium carbide, which has been ground to pass a 35-mesh sieve and hold on 60-mesh sieve, was added to the corn and salt mixture.

This combination in the flask was quickly mixed with the stirring rod. The flask was rotated in a semi-horizontal position to bring the mixture into contact with any moisture that had collected on the sides. When the mass became "dry" and uniform in appearance, the stirring was discontinued and the material allowed to cool. When it was down to room tem-

perature (after about 10 min.), it was weighed.

The reaction of the carbide with water must be carried out in a well ventilated area, preferably under a hood. Acetylene is physiologically disagreeable and may reach a flammable concentration. And precautions should also be observed when disposing of carbide in excess water.

In calculating the moisture in samples of type A, the formula is simple:

$$\frac{Y - Z}{\text{Wt of Sample}} \times 1.38^{*} \times 100 = \text{percent } H_2O$$

where Y = wt. of flask, rod, and salt + sample + carbide (before reaction)

Z = wt. of flask, rod and salt + sample + carbide (after reaction)

* Factor for converting weight of acetylene evolved, to the weight of water according to equation $CaC_2 + 2H_2O = Ca(OH)_2 + C_2H_2$

With samples of type B, where water is added for blending, the calculations are made as follows:

$$\frac{[A(B + C)] - 100(C)}{B} = \text{percent } H_2O$$

where A = percent H_2O found by method used for samples of type A (see first formula above)

B = weight (grams) of sample of corn blended

C = weight (grams) of water added for blending

In the first investigation, whole-grain blanched, frozen corn was the only product available and was hence used in the development of the method. Table I shows comparison results obtained with the frozen product in both the calcium carbide and the vacuum oven methods.

Later, the method proved readily applicable to fresh corn, and Table II shows the results obtained, again with the two procedures. Weighings were made with an analytical balance to the nearest 0.2 mg. and also with the torsion balance to the nearest 5 mg. The data shown in both tables indicate that either type of balance can be used.

It was found that both the mill and the blender would give satisfactory results. The mill grinding was preferred, however, because it permitted better sampling and greater precision. In the preparation of the sample with the blender, the pericarp was not well disintegrated and extra manipulations and calculations were necessary. Any equipment that will give proper fragmentation can be used to prepare corn for analysis.

Most of the samples were easily measured and conveniently delivered to the flask by use of a 10-ml. measuring pipette, which was cut off at the 9-ml. mark. It was necessary to use a small spoon to transfer low-moisture frozen corn samples, because of their thick, non-fluid consistency.

Several deviations from the recommended procedure were investigated. Simple laboratory vessels were tested, and it was found that 125-ml. Erlenmeyer flasks were most suitable for reaction vessels. Beakers were not suitable because they permitted atmospheric moisture to interfere.

Calcium carbide, more finely ground than that recommended, was found to be easily carried out of the flask by escaping acetylene. Coarser carbide failed to react completely with all the water.

"Spare the rod"

When calcium carbide was added to the corn sample in the Erlenmeyer flask and the material was mixed with the stirring rod, the reaction was so vigorous that moisture vapor escaped. In an attempt to slow down the reaction, the carbide was added to cover the corn sample and the reaction was allowed to proceed without stirring. The reaction proceeded slowly, but the portion of the corn that came in contact with the carbide formed a dry protective coating over the remainder of the sample and the reaction would not go to completion.

Stirring at this stage did not complete the reaction. The fact was that the stirring could not be regulated to give consistent results, because either an excessive amount of moisture was lost or there was a formation in the mixture of lumps that retained appreciable amounts of water. Sand was added to the corn samples in an attempt to dampen the reaction and to prevent the lump formation. At any rate, no significant improvement in the precision or accuracy of the method resulted.

In another experiment to control the speed of the reaction, more C.P. salt than would dissolve was added to the corn sample and an intimate mixture was made by stirring. It may be noted here that ordinary table salt was not used, because it contains a moisture-absorbing agent. The carbide was then added and the mixture was stirred until reaction was complete. This procedure gave satisfactory control of the reaction speed.

New Way "Checks" With Vacuum Oven Method

TABLE I—FROZEN CORN. Comparison of Moisture Values Obtained by Calcium Carbide and Vacuum Oven Methods

	Sample No.	Percentages by Calcium Carbide Method: Weighing by Torsion Balance	Av.	Weighing by Analytical Balance	Av.	Percentages by Vacuum Oven Method
Prepared for Analysis With Mill*	1	(77.5,77.9,77.8,77.2)	77.6	(78.3,78.0,77.8,77.9)	78.0	77.4,77.5
	2	(77.8,77.5,78.3,78.1)	77.9	(78.4,77.6,78.4,78.4)	78.2	78.1,78.1
	3	(72.6,72.6,72.5,72.4)	72.5	(72.6,72.6,71.9,71.9)	72.2	72.8,72.8
	4	(72.3,70.5,72.1,71.8)	71.7	(72.1,71.9,72.1,71.6)	71.9	72.5,72.6
	5	(78.7,78.3,78.9,78.5)	78.6	(78.5,78.9,79.1,79.6)	79.0	78.5,78.6
	6	(77.9,78.1,79.1,78.0)	78.6	(78.8,78.8,78.7,78.0)	78.6	78.7,78.8
	7	(73.7,73.0,74.9,73.4)	73.5	(74.0,74.0,75.0,73.6)	74.2	74.3,74.3
	15	(72.9,73.5,74.3,74.2)	73.9	(73.2,74.0,74.9,74.3)	74.1	73.9,74.0
Prepared for Analysis With Blending Unit**	21	(79.3,79.4,78.7,79.3)	79.2	(79.6,79.8,79.3,79.6)	79.5	79.3,79.3
	22	(78.0,78.5,78.0,78.6)	78.3	(79.6,79.3,77.7,79.6)	79.0	79.0,79.0
	23	(74.2,73.5,73.0,73.4)	73.5	(74.3,73.4,73.2,73.1)	73.5	73.8,73.8
	24	(71.4,71.3,71.5,71.9)	71.5	(71.5,70.8,71.4,72.4)	71.5	72.8,72.6
	25	(80.7,80.9,81.4)	81.0	(80.5,80.5,81.4)	80.8	80.2,80.2
	26	(80.3,79.0,79.0,78.4)	79.2	(79.8,79.8,79.5,79.5)	79.6	79.5,79.5
	27	(74.7,74.4,74.7,75.0)	74.7	(75.0,74.7,74.7,75.4)	74.9	75.3,75.2
	33	(72.1,74.7,75.1,73.4)	73.3	(72.7,74.0,75.5,72.3)	73.7	73.9,73.9

* Intermediate Wiley type ** Waring Blendor

TABLE II—FRESH CORN. Comparison of Moisture Values Obtained by Calcium Carbide and Vacuum Oven Methods

	Sample No.	Percentages by Calcium Carbide Method: Weighing by Torsion Balance	Av.	Weighing by Analytical Balance	Av.	Percentages by Vacuum Oven Method
Prepared for Analysis With Mill*	51	(71.8,71.4,71.4,71.3)	71.5	(71.8,71.0,71.1,71.8)	71.6	70.9,70.9
	52	(69.4,69.5,70.1,70.4)	69.9	(70.0,69.8,70.0,70.1)	70.0	70.4,70.3
	53	(68.1,67.6,67.6,68.0)	67.8	(68.0,68.3,68.0,68.3)	68.2	68.1,68.2
	54	(67.5,67.9,68.0,68.2)	67.9	(67.0,67.1,68.3,67.9)	67.6	67.6,67.7
	55	(62.9,62.5,62.9,63.1)	62.9	(62.8,63.2,63.0,62.7)	62.9	63.0,63.1
	56	(72.0,72.3,73.1,72.5)	72.5	(72.2,72.8,73.3,73.0)	72.8	72.4,72.5
	57	(78.1,80.2,79.5,79.7)	79.4	(78.1,79.5,80.0,80.1)	79.4	78.4,78.4
Prepared for Analysis With Blending Unit**	51	(69.1,69.3,69.1,70.3)	69.5	(68.7,69.1,69.2,70.3)	69.3	70.5,70.4
	52	(70.6,69.6,73.0,69.1)	70.6	(70.6,70.1,72.9,70.1)	70.9	70.3,70.9
	53	(68.8,67.3,68.8,68.8)	68.4	(68.4,68.4,68.7,67.9)	68.4	68.7,68.1
	54	(68.2,68.9,68.5,67.6)	68.3	(68.9,68.1,68.5,67.7)	68.3	68.9,69.4
	55	(59.1,61.2,59.4,59.1)	59.7	(59.1,60.6,58.9,58.7)	59.3	61.0,61.2
	56	(71.7,71.7,71.3,73.5)	72.1	(71.5,71.9,72.1,73.5)	72.2	71.1,70.9
	57	(79.4,78.5,78.0,77.4)	78.3	(79.1,79.1,78.3,77.9)	78.6	77.6,77.6

* Intermediate Wiley type. ** Waring Blendor

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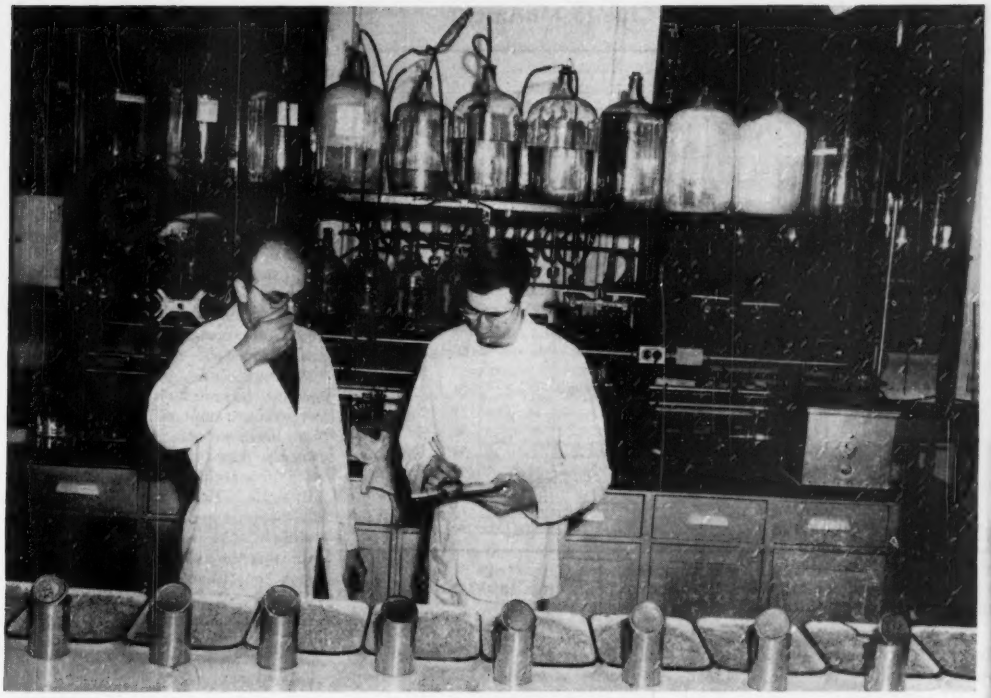

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WILBUR A. GOULD
Assistant Horticulturist,
The Ohio State University, Columbus

CONCLUDING PART II

Application of quality control to a food processing operation begins when the raw products are graded as the basis of pay to the grower or supplier.

Control of the operation continues through the factory, where the technologist determines efficiency of the various steps concerned with preparation, packaging and coding. Finally, quality indices are applied in evaluating the grade of the finished food and in making comparisons with the products manufactured by the competitors.

Acquisition of the correct tools for setting up and operating a quality control program was discussed in Part I of this article. Now let us consider the representative tests—the yardsticks with which the quality control technologist must be thoroughly adept if he is to properly assist management in solving the many problems in the processing and control of high quality, uniform products.

Tests Described

In presenting these details, we will show the subordinate relationships of the various test classifications by the different indenting of the initial category paragraphs.

1. Organoleptic Subjective Methods

These are based on the opinions of investigators. It is usually a physiological reaction which is a result of past training, experience of the individual, influence of personal preference, and powers of perception.

They are subjective, because the individual is required to go through a mental process in giving his opinion as to qualitative and quantitative values of the characteristic or characteristics under study. This type of measuring can be divided into two general groups:

1.1 Preference (Acceptance) Test-

Hardness Factor Gives Speedy Clue to Maturity

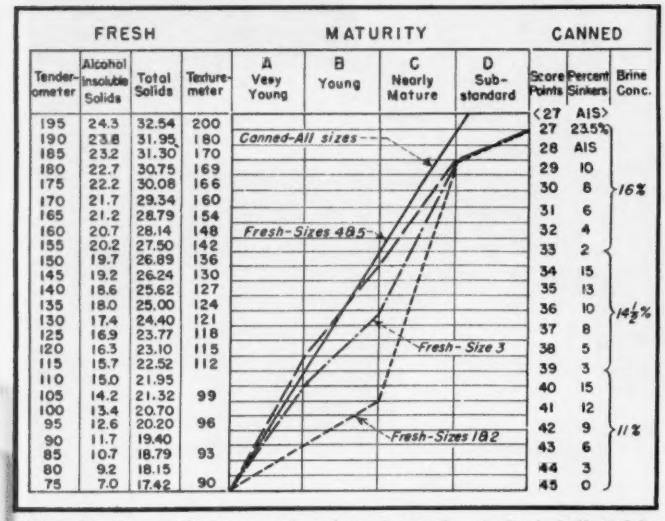


FIG. 1. Texture of Alaska peas at various stages of maturity is indicated by readings on tenderometer, which measures force required to shear sample, and on texturemeter, which measures force to penetrate peas.

ing. When conducted with large enough numbers it determines consumer acceptance of a product. When done with foods in general, it permits the determination of population appetite levels, and will tell the processor the acceptance or rejection of his product or products.

1.2 Difference (Psychometric) Testing. This procedure is used to indicate differences—that is, to rate or score food quality factors, or evaluate quality changes in a given food during storage life, particular processing technics, and/or to standardize food preparation formulas. One of the first requirements is to establish a panel of trained organoleptic tasters that can repeat themselves. When this testing is done under controlled conditions, and the results are treated statistically, it proves to be one of the simplest and quickest methods of quality evaluation.

2. Objective Methods

These are based on recognized standard scientific tests, and are applicable to any sample without regard to its previous history or ultimate use. They represent the modern idea in quality control, because the human element (the attitude of the investigator) has been excluded. They can be divided into the following three general groups:

2.1 Physical Methods of Measurement. Quickest of the three, these require the least training.

2.11 Size of Units. Usually, this approach is thought of from an economic standpoint, since certain sizes are in demand more than others, depending on the intended use of the product. The tests may be based on the number of units per pound, sieve size, actual length or width.

An example of this type of measurement is found with the sizing of snap beans, determined by measuring the shorter diameter transversely to the long axis at the thickest portion of the pod. The various sizes of canned snap beans are: No. 1, less than 14½/64 in. thick; No. 2, 14½/64 to 18½/64 in. thick; No. 3, 18½/64 to 21/64 in. thick; No. 4, 21/64 to 24/64 in. thick; No. 5, 24/64 to 27/64 in. thick; and No. 6, 27/64 in. or more in thickness.

2.12 Color. This is important because it may be an index to maturity, freshness, or consumer eye appeal. And uniformity is almost as important as degree of brightness. Color is one of the biggest problems food processors have to contend with, and one which they must evaluate properly because of the rulings on its limits by the minimum standards of color in the different grades. The simplest method of measuring color is Maerz and Pauls' *Dictionary of Color,* where the product is matched with the color plates.

Another is the Munsell System, in which the actual hue, chroma and value are determined. By this method, definite valuation of the color of a particular product is made in two parts: The first is the percentage of the different specific colors which, when blended together, give a composite color which exactly matches the sample. The percentage notations of a particular color must always add up to 100.

The second essential part is the exact description of each color card's "brilliance" and "chroma". Each class of agricultural products requires a particular set of cards. For example, the color of canned tomatoes and tomato products may be matched by varying the proportions of four colors; namely, definite shades of red, yellow, neutral black and neutral gray.

These colors are designated by specific formulas, in each of which there is an empirical designation of, first, *hue;* second, *value;* and third, *chroma.* The formula of the red color used in matching tomato products is 5R2.6/13. Here, 5R indicates the hue—a pure red free from purple or yellow. The second notation, 2.6, indicates the value or intensity of the black constituent of the color. This is expressed in an arbitrary scale from 0–10, where zero is absolute black and 10 is absolute white. A value of 2.6 indicates a considerable proportion of black constituent. The final designation shows the chroma—strength or intensity of the color. This notation is in an arbitrary scale, from 0 to 10, or even further. In this case it is 13, indicating a very strong, intense red color.

Colors Matched With Series of Disks

The required color cards, which can be obtained only from the Munsell Color Co., are cut in the form of Maxwell disks. These are uniform circles with a small hole at the center and a single radial slit from the center to the edge. The disks may be placed one on the other, and slipped together by means of this radial slit, so that any desired proportion of one or more of the colors may be exposed on a segment of the single circle that is visible.

When these disks are held together (with a suitable binding post at the center) and spun at a speed great enough to eliminate flicker, the color seen by the eye is the sum of the different segments exposed. The amount of each card exposed is changed until the combined effect exactly matches the color of the sample. The amount of each color is then measured by the percent of the circle occupied by each segment.

Still another example of measuring color, and one which eliminates the human error due to color blindness, is the amount of pigment in question that can be extracted and

measured by use of colorimeters, or by absorption and transmittance measurements at particular wave lengths for the products in question.

2.13 Texture and Body. These refer to the structural make-up of the fruit or vegetable tissue, with the variations having a great deal to do with the acceptability of a number of the products. These tests give a good indication of the maturity of the raw product, and they serve as control tests for loss of quality during the holding, storage, and handling of the products prior to processing. Specific examples are:

2.131 Texture. Concerned here is the rigidity or solidity of the units within any food product. Examples of the types of instruments used to measure it are the tenderometer, texture meter, penetrometer, Textureometer, and pressure tester. They are used with peas, sweet corn, lima beans, snap beans, apples and peaches.

An illustration of the use of two of these instruments on Alaska peas is shown in Fig. 1. As the peas increase in maturity they become harder and more resistant to the pressure of the instruments. Amount of force required to shear the sample is shown by the tenderometer, and force needed to penetrate through the peas is indicated by the texturemeter.

The Textureometer is a new instrument for measuring toughness of samples, such as snap beans, by a series of wires cutting through one sample[12].

2.132 Succulence. This frequently refers to the amount of free liquid associated with the solid units of the food product. The volume of liquid obtained is the measure of maturity when applied to sweet corn.

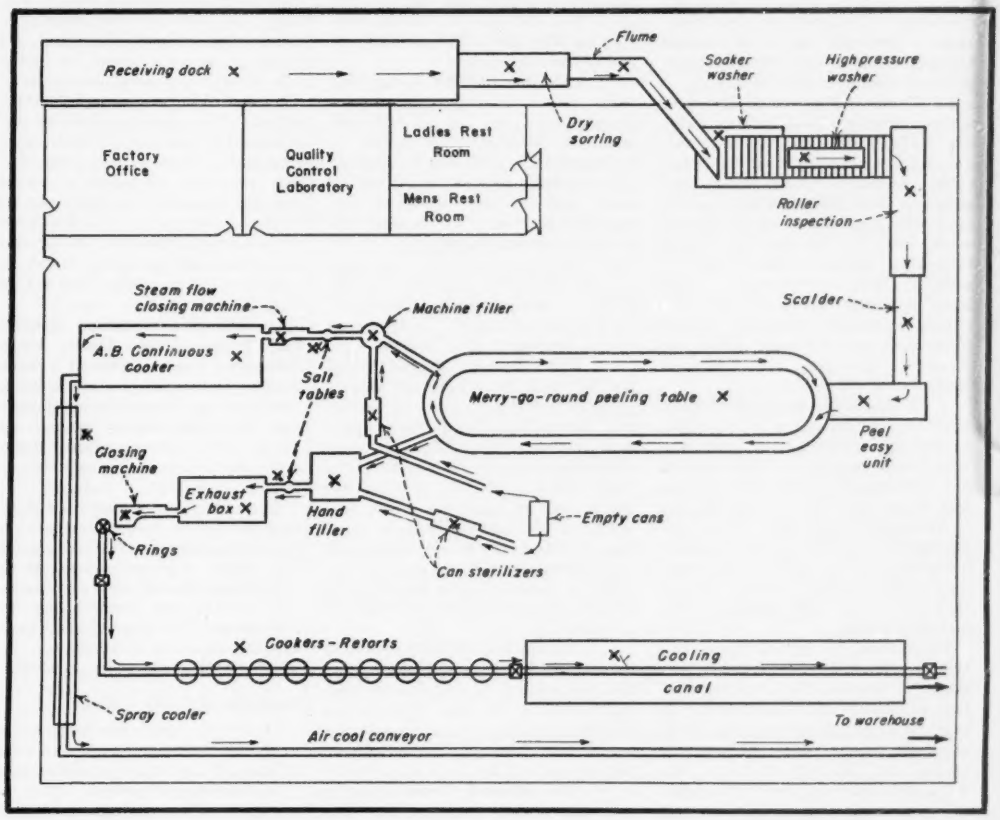
The younger the corn, the more the liquid. And as the maturity advances, the amount of liquid decreases. This is shown in Fig. 2 for samples of A and B Grade canned whole grain corn.

2.133 Consistency is a combination of size and texture of the solid units, the viscosity of fluid, and the proportion of the solids to the fluid. Instruments generally used are the Bostwick and Adams consistometers. They measure how far the material flows, under its own weight, along a level surface in a given period of time, or the line spread of the materials, respectively. The instruments are used for tomato products, cream style corn, apple sauce and baby foods.

2.134 Specific Gravity can usually be calculated from the amount of soluble constituents present in a mixture or in a solution. This test is used extensively on grades and specifications of tomato products, syrups for fruits, brine concentrations in packing mediums, beverages, and brine flotation of peas (as shown in Fig. 1). Some of the many instruments in general use are hydrometers, refractometers, Sprague cups, polarimeters, and the Westphal balance.

2.135 Imperfections and Waste refer to the amount of material that is unfit for human consump-

"X's" Mark the Spots for Quality Control of Whole Tomatoes



Volume of Liquid Indicates Maturity of Sweet Corn

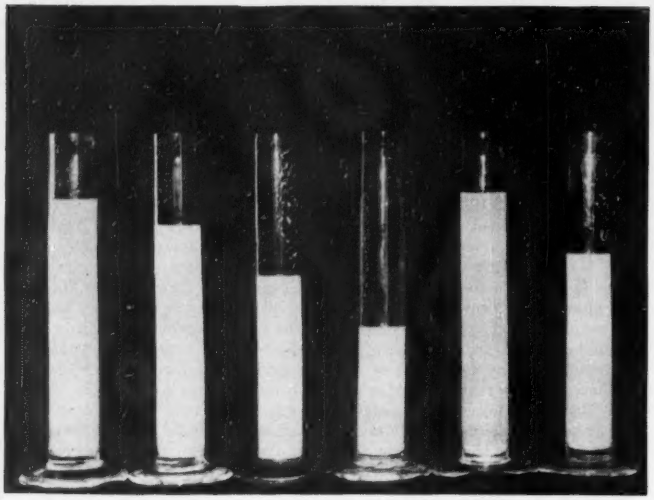


FIG. 2. Shown above are the different amounts of liquid obtained from various grades of canned whole grain corn with succulometer. Left to right: Top Grade A; bottom Grade A; bottom Grade B; bottom Grade C; slightly immature; and top Grade B.

tion. It must be evaluated by direct weighings on segregated materials. Usually reported on a percentage basis, it is one of the most important physical measurements of quality.

2.2 Chemical Methods of Measurements. Standard food analysis methods (AOAC, Woodman, Winton, and Jacobs) are generally used for quantitive evaluation of nutritive and quality levels. However, these analyses are too long and costly for routine work, and the industry, and allied interested parties have developed methods that are termed "quick tests." In many cases, these can be closely correlated with the longer procedures and accurate values determined. Here are a few illustrations:

2.21 Alcohol Insoluble Content. Interest is in harvesting of vegetables at the optimum stage of maturity, which varies not only with the variety but with intended use. For processing, using peas as an example, the technologist is interested in the proportion of insoluble solids (content) —represented by the alcohol insoluble solids content (AIS). Fig. 1 shows how the AIS increases with maturity in peas.

To perform the test, a representative sample is macerated and a portion of it weighed into a volume of 80 percent alcohol and simmered for 30 min. It is transferred to a previously weighed filter paper, thoroughly washed and dried at 100 deg. C. for 2 hr., and then reweighed. The difference in weight represents the insoluble solids content, and the percentage is then determined. Alaska peas with an AIS above 23.5 percent are substandard in quality.

2.22 Fiber Content. Using snap beans as an example, the fibrous material must not exceed 0.15 percent. A representative sample is macerated in a metal cup of a malted milk stirrer, covered with boiling water and 50 percent sodium hydroxide, then boiled for 5 min. The sample is stirred, transferred to a 30 mesh Monel screen, and thoroughly washed with water to remove all the alkali. It is then dried at 100 deg. C for 2 hr. and reweighed. Difference in weight represents fiber content.

2.23 Vitamin Content varies, not only with the variety and area of production but also with the process and storage conditions. Some applications of vitamin values in fruit and vegetable products are found in the juices on the market carrying the AMA seal of approval. This seal indicates that the vitamin in question is within the limits established. As an example, with tomato juice the AMA is considering a minimum of 20 mg. of ascorbic acid per 100 ml. of juice.

2.24 Enzyme Activity was used extensively in determining the storage life and quality of dehydrated vegetables during the war. And it is a factor of quality in frozen vegetables and fruits. Testing is for the absence of enzyme activity.

2.25 Mineral Content varies with the product and process. Calcium is perhaps the most studied mineral at the present time. It is beneficial in products like tomatoes and apples, that tend to mush up on heating. Therefore, calcium compounds are added, which in turn react with the pectic compounds to form calcium pectate that adds rigidity to the tissues.

Presence of large quantities of calcium in water used for processing peas and snap beans induces an undesirable hardening effect. Processors of these vegetables must use soft water or resort to softening agents. The quality control technologist must be familiar with calcium and magnesium determinations, since each of these minerals reacts somewhat differently, depending on the fruit and vegetable tissues in question.

2.26 Acid Content. With tomato products and juices, pH and total acidity have been considered both as factors of quality and also as factors in evaluating processing times. Certainly, these methods of quality determinations and analyses need more emphasis in the quality control program.

2.3 Micro Methods have excellent application in a quality control program, but considerable training is required to properly interpret the results. The methods can be divided into these two general categories:

2.31 Adulteration and Contamination. Here, the examinations will indicate the presence of mold, insect fragments, insect excreta, and foreign materials. Each test is specific, and the technologist must have the proper background to differentiate the different types of adulteration and contamination that might be present in the products (Food & Drug Circ. 1).

2.32 Differentiations Between Cell Types, Tissue Types, Micro-Organisms and Different Stored Foods. Here, examples are found in tissue testing for deficiency of fertilizer materials, stored food in the tissues of plant materials, microorganisms causing spoilage and desirable fermentation changes.

This entire field is only now beginning to open up, and the technologist must keep abreast of the changes taking place. A good example of the work being carried on is the application of staining technics for the identification of fiber in snap beans and asparagus to eliminate the hazardous F&DA determination of fiber.

Application of Quality Control

In the flowsheet for tomato canning, quality control is broken down at each of the following operations:

A. Receiving Platform. Here the grade is determined as a basis of

payment to the grower. The quality control technologist must first evaluate the color of the raw product. This is usually done on the basis of the USDA's Fresh Tomato Standards. To meet U.S. No. 1, the fruit must have 90 percent tomato red color.

Interpretation is that "tomato red" means the color produced by the following combination of the Munsell disks: 65 percent red (5R 2.6/13), 21 percent yellow (2.5Yr 5/12), and 14 percent black (N1) and/or gray (N4). If the color is 70 percent U.S. No. 1, the technologist knows what grade can be expected in the finished product, provided he has control of the entire packing operations. Color may vary from 40 to 100 percent tomato red and for each rated decrease in color, he should know the grade to be expected.

In addition to color, the technologist determines the amount of waste the trimming line must remove. He must know the amount present and advise accordingly. Extraneous material should be determined likewise.

Size is also important in a whole-tomato line. In addition to the range in size, uniformity may be more important, depending on the intended use for the products. Consequently, this must be known for each load. Also, firmness and ripeness of the fruits need to be determined if whole tomatoes are being packed, since soft, watersoaked, or overripe fruits will not make a "Fancy" pack.

B. Conveyors to Production Lines. The product may be conveyed to the plants by the conventional dry belt conveyors or by flumes. In the former case, the product may be cleaned by action of these conveyors, and the technologist should investigate the efficiency of this cleaning action, the speed of the conveyors, and the handling of the fruits.

In the flume system, he must check the cleanliness and temperature of the water, and pressure used on the agitation lines. Water at 120 to 130 deg. F., will do a more efficient cleaning job than cold water. Likewise, amount of agitation in the flumes is a factor. In addition to these points, the amount of recirculated water and its cleanliness should be checked, if for no other reason than for sanitation and efficiency of the cleaning action.

C. Sorting. Moreover, the quality control technologist must check the load on the belts, speed of conveyors, efficiency of sorters and amount of defective fruits or parts thereof remaining. Many plants sort the fruit after it comes from the soaker and high-pressure spray wash—using a roller conveyor to move it in front of the sorters. This increases efficiency of inspectors and lessens the load on the peelers.

Regardless of the type of equipment, sorting is one of the most important steps to control, since the amount of damaged, rotted, or otherwise defective fruits will give a good indication of the work required of the trimmers and peelers as well as the grade of the finished product.

D. Washers. Though the fruit may be washed earlier, this is not necessary. Hence, washing follows sorting in this present sequence. At any rate, the technologist's job is to check the temperature and volume of water, pressure on the spray lines, location and opening of the nozzles, air agitation in the soaker washer, speed or load of fruit, and efficiency of the operation. Where possible, recording instruments should be used. This lessens the technologist's job, since the plant personnel will then be operating on standards previously established, and he has only to check the efficiency of the operation.

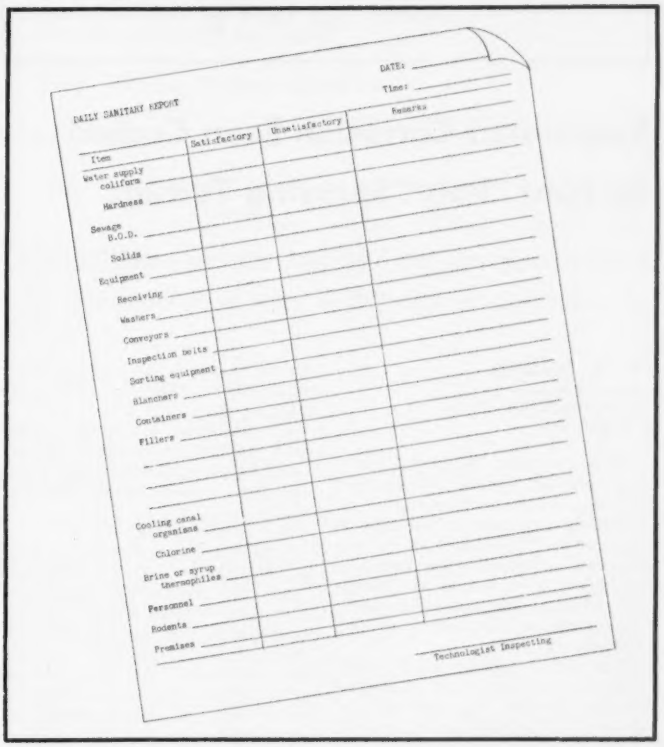
E. Scalders. The technologist should check the time and temperature of the scalders. Since the time is relatively short, he must carefully inspect this operation to see that there is no over-scalding, which will cause considerable loss of solids and tend to result in a product that does not grade high on wholeness.

F. Peelers. This is perhaps the greatest problem for the technologist, since he is confronted here with the human element. The workers' shortcomings will show up in the finished product, hence he must check the amount of defective units coming off the end of the line. This includes poor-colored fruits, rots, extraneous matter, wholeness, amount of peel, amount of core tissue, and the general workmanship. At this point, he should know the quality, since this is the determining factor in the finished quality—at least, from the standpoint of workmanship and defects, if any.

G. Fillers. Here, he determines the drained weight, fill, wholeness, mold in juice, color, salt and temper-

(*Turn to page* 184)

"Jot It Down" Form Aids Cleanliness



DAILY SANITARY REPORT

DATE:

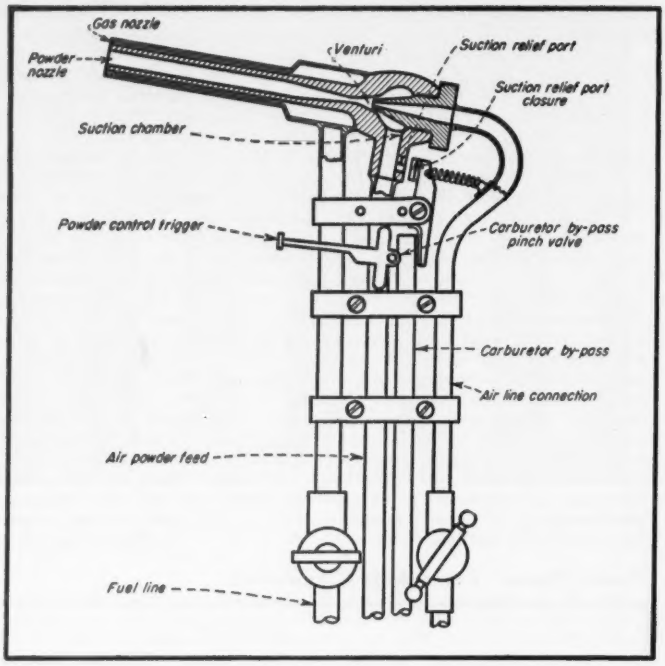
Time:

Item	Satisfactory	Unsatisfactory	Remarks
Water supply coliform			
Hardness			
Sewage B.O.D.			
Solids			
Equipment			
Receiving			
Washers			
Conveyors			
Inspection belts			
Sorting equipment			
Blanchers			
Containers			
Fillers			
Cooling canal organisms			
Chlorine			
Brine or syrup thermophiles			
Personnel			
Rodents			
Premises			

Technologist Inspecting

SANITARY conditions throughout plant and surrounding areas should be evaluated daily, and each piece of equipment should be checked in morning, at each lunch period, and between shifts. Method for correcting unsatisfactory conditions should be noted. Sanitation may be technologists' biggest problem.

Flame-Spray Gun and How It Works



Equipment Corrosion Seen Curbed By New "Poly" Spraying Technic

Food processors might well look into the possibilities of prolonging the life of their units by this method

W. B. DeLONG
Engineering Department,
E. I. du Pont de Nemours & Co.,
Wilmington, Del.

With the recent development of a new spraying technic, polyethylene* can now be successfully coated on processing equipment. Test data on the coating's resistance to various chemicals indicate that the technic is the answer to some food plant problems, although information on specific applications in this field is not yet available.

This method requires: (1) The addition of a small amount of graphite to the polyethylene, (2) preheating of the target to 400-500 deg. F., and (3) the use of a gun which utilizes a softer flame than is customary with metal-spraying guns.

By this means, it is simple to deposit polyethylene coatings which are essentially undegraded and impervious. And these coatings readily adhere to steel.

Now for the details:

Corrosion experts were full of hope in 1943 when polyethylene resins first came into commercial production. Here was a material with the corrosion resistance of paraffin but with much better physical properties. It looked like "a natural" for lining storage tanks, drums, and other equipment where heat was not a problem but corrosion was.

But then the troubles began. Polyethylene could not be applied as a paint film from a solvent because of its virtual insolubility in liquids. If stable emulsions were used, the material coated had to be baked to get a continuous film.

Flame spraying of the polymer looked like the solution. But conventionally sprayed coatings did not give too good results. First, polyethylene was degraded to a material with faulty mechanical properties and unsatisfactory corrosion resistance. Second, there was poor adhesion to the metal surface.

Flame-Spray Gun the Answer

Now, development of a new flame-spray gun has eliminated most of the troubles. Tests of coatings applied by this technic have shown:

1. Graphite-modified polyethylene coatings have been found porosity-free by a 30,000v. spark test.

2. Exposure tests of a year's duration have shown no attack on the base metal or deterioration of the coating by hydrochloric, hydrofluoric, sulphuric, or formic acids.

Preparation of continuous coatings from powder obviously requires fusion in order to "wet" the target surface and to coalesce the particles into a continuous film. It is necessary, therefore, to heat the particles to their melting point, but not much beyond it, and to keep them at this temperature long enough to permit coalescence.

Early experimental work with flame-spraying guns designed for metal powders proved that the flame was too hot and too short to melt the particles without degradation. Experiments on heating polyethylene particles by dropping them through heated tubes indicated that the heating time necessary for melting at temperatures sufficiently low to avoid degradation was considerably longer than when projecting them from a gun in a flame or heated gas stream. Efforts toward devising a technic that would provide a stream of completely melted particles were therefore abandoned, and attention was given to preheating the particles in transit, followed by melting in place on the target surface.

Construction of the Gun

This method was accomplished by using a spray gun in which the flame was relatively long and low in temperature, compared to conventional metal-spraying guns. The gun has a venturi for drawing in a mixture of polyethylene particles suspended in air, a tube for expelling the mixture, and a larger concentric tube for carrying the fuel gas.

The proper flame is obtained by mixing fuel gas and combustion air *beyond* the torch nozzle, rather than by premixing them. Both city gas and acetylene have proved satisfactory.

The sketch accompanying this article

* The chemical term "polyethylene" (polymerized ethylene) is used here. However, it is to be noted that in the du Pont Co. the designation "polythene" is employed as the generic name for resins of this type.—The Editors.

illustrates features of the laboratory gun. Air for the venturi is supplied by one line, and the air-powder mixture by another. Fuel gas, entering by a third line, is expelled through the gas nozzle, a concentric tube around the nozzle that carries the air-powder mixture. Valves are provided on the fuel and air lines for regulating the volume of gas and for controlling the velocity of the air-powder mixture. A suction relief port and closure are provided for on-and-off control of the powder flow.

The air-powder mixture may be supplied by any means that will produce a cloud of polyethylene particles suspended in air. In our tests, satisfactory performance was obtained with a commercial carburetor-type feeder that requires only a small amount of air at low pressure. When it is desired to operate the gun without feeding powder, as during preheating, the carburetor-air supply is simply bypassed through a soft rubber line. A pinch valve is provided for closing the by-pass and building up the pressure required to make the carburetor function. This action is accomplished with the simultaneous movement of the suction relief port closure when a control trigger is operated.

Adjustments in the powder-feed rate can be made by regulating the air pressure delivered to the carburetor. The valve in the air line connection is used to alter the flame characteristics.

Providing Adhesion

Adhesion of these flame-sprayed polyethylene films to metallic surfaces is governed by the same considerations that apply to most surface coatings. The target surface must be clean—free of grease, dirt or foreign material.

It may be noted here that sandblasting is a reliable means of cleaning the metal surfaces. At the same time, it roughens them so that the coating is more effectively keyed in place. Another thing: It has been found necessary to preheat the target surface to 400–500 deg. F.

Because it is impossible to produce a stream of completely molten undegraded polyethylene particles, some of the melting heat must be supplied by the target in order to achieve fusion and coalescence of the individual particles into a continuous film. Furthermore, polyethylene at its melting temperature, or slightly above, is quite viscous, so that it is necessary to hold it at these temperatures an appreciable length of time before flattening and coalescence of the particles can take place. Preheating of the target provides the heat reservoir necessary to complete the melting on the target surface, and it is essential for good adhesion.

Even with the preheating, flame-sprayed, unmodified polyethylene coatings do not adhere well to metal surfaces if they are allowed to air-cool after deposition. It is interesting to note that immediate water-quenching of hot coated surfaces affords excellent adhesion. It is believed, although not proven, that this behavior is the result of different crystallization phenomena obtained by the two methods of freezing and cooling to room temperature. We hasten to point out, however, that this water-quenching is not a practical procedure for any but small articles.

Several modifiers have been found which, when added to polyethylene powder in small amounts, improve the adhesion of flame-sprayed polyethylene coatings to metal surfaces even when air-cooled. Of the materials evaluated, finely powdered graphite or carbon black in the amount of about 0.5 percent mixed with 60-mesh polyethylene powder were found to be most effective. There is no explanation for this behavior, although the effect of these materials on crystallization of the melt on freezing is again felt to be responsible. Other inert modifiers were only partially effective. Preheating is still required.

No satisfactory method for the quantitative measurement of the degree of adhesion of flame-sprayed coatings to metal surfaces has been worked out. In this experimentation, adhesion was evaluated by attempting to pull, by hand, a strip of the coating from the base material. Two parallel cuts, several inches in length, were made in the coating and the material between them undercut to form a strip approximately ½ in. x 1 in. for a finger hold. Adhesion is not considered to be satisfactory if it is possible to strip the coating before it breaks in tension.

How to Apply the Coating

Preheating may be carried out either with the flame-spraying gun or other torches, depending upon the size and shape of the part to be spray-coated. Handling of the gun and application of the coating is much the same as in spray-painting. A 2 ft. x 3 ft. area is covered, at one time, by a series of overlapping strips, approximately 2 in. wide, which are applied in a continuous manner at a torch traverse speed of 0.5 to 2 ft. per sec. Immediately upon completion of one pass over the area, another one is made, starting at the original point and proceeding in the same direction

(*Turn to page* 181)

"Poly" Proves Highly Resistant

TABLE—DATA SHOW Effects of Various Corrosive Chemicals on Polyethylene Coatings

A. Long-Time Exposure (Polyethylene-Coated Steel Test Vessels, Flame-Sprayed)

Reagent	Concentration (Percent by Weight)	Temp. (Deg. F.)	Exposure Time (Mo.)	Results: No Change (x)	Results: Failure (x)
Hydrochloric acid	37.0	70	13	x	....
Hydrochloric acid	37.0	140	9	x	....
Hydrochloric acid	10.0	70	13	x	....
Sulphuric acid	95.5	70	13	x	....
Sulphuric acid	40.0	140	8	x	....
Sulphuric acid	10.0	70	13	x	....
Nitric acid	65.0	70	1	...	x
Nitric acid	10.0	70	13	x	....
Hydrofluoric acid	35.0	70	13	x	....
Acetic acid	99.5	70	13	x	....
Acetic acid	99.5	70	7	...	x
Acetic acid	99.5	140	1	...	x
Acetic acid	10.0	70	13	x	....
Formic acid	90.0	70	13	x	....
Formic acid	90.0	140	9	x	....
Ferric chloride	10.0	70	13	x	....
Ferric chloride	10.0	140	9	x	....
Sodium hydroxide	70.0	70	13	x	....
Sodium chloride	Sat'd	70	13	x	....
Formaldehyde	37.0	70	13	x	....
Weather-outdoor exposure	....	....	8	x	....

B. Short-Time Exposure* (Polyethylene-Coated Strips, Flame-Sprayed)

Solution		Wt. Change	Dimensional Change	Appearance
Sulphuric acid	30%	0.3 % increase	None	Unchanged
Sulphuric acid	3%	0.04% increase	None	Unchanged
Nitric acid	10%	0.06% increase	None	Unchanged
Hydrochloric acid	10%	0.01% decrease	None	Unchanged
Acetic acid	5%	0.3 % increase	None	Unchanged
Oleic acid	100%	1.0 % increase	0.4% increase	Unchanged
Sodium hydroxide	10%	0.1 % increase	None	Unchanged
Sodium hydroxide	1%	0.01% increase	None	Unchanged
Ammonium hydroxide	10%	0.2 % increase	None	Unchanged
Ethyl alcohol	95%	0.4 % increase	None	Unchanged
Ethyl alcohol	50%	0.2 % increase	None	Unchanged
Acetone	100%	2.0 % increase	0.4% increase	Unchanged
Ethyl acetate	100%	7.0 % increase	0.9% increase	Unchanged
Ethylene dichloride	100%	15.0 % increase	2.0% increase	Unchanged
Carbon tetrachloride	100%	69.0 % increase	7.0% increase	Unchanged
Toluene	100%	29.0 % increase	5.0% increase	Unchanged
Gasoline	100%	7.0 % increase	0.6% increase	Unchanged
Sodium chloride	10%	0.1 % increase	None	Unchanged
Sodium carbonate	2%	0.01% increase	None	Unchanged
Hydrogen peroxide	3%	0.06% increase	None	Unchanged
Distilled water	100%	0.07% increase	None	Unchanged

* ASTM Des. 543-43—25 deg. C. for 7 days.

How It Delivers

OUTSIDE VIEW. When coin is placed in slot, proper change is made and container is delivered to waiting customer.

How It Works

INSIDE VIEW shows how quart containers are arranged on two separate shelves composed of endless belts.

Milk At the Drop of a Coin

Apartment house dwellers given basement service with new dispenser. They can get milk at any hour and at the basic store price

A. V. GEMMILL
Assistant Editor, "Food Industries"

A new method of distribution that is expected to exert a profound influence upon the market milk industry is on trial in a suburban area of New York City.

Provided is a coin-operated unit that dispenses milk in quart containers. And installation is in apartment houses. The dispenser's capacity is 150 quart containers, which are held at uniformly low temperatures by circulation of air from a refrigeration unit in the machine's base.

The coin changer will handle a quarter or combination of smaller coins, returning the correct change. In the test area, where the current price is 19c per quart, it returns 1c, for instance, when two dimes are put in.

These four advantages are seen won with the dispenser: (1) It makes milk available over the entire 24-hr. day; (2) simulates "home delivery" at the "store" price; (3) cuts down on delivery cost; and (4) eliminates the possibility of milk standing unrefrigerated in hallways.

Yet to be evaluated is still another advantage now foreseen—an increase in consumption resulting from the above-mentioned availability and lowered price.

Dispensers were developed, and are now being manufactured especially for City Milk Co., Maspeth, Queens, N. Y. The company was able to draw upon experience gained in its twelve years of vending milk products (in $\frac{1}{3}$-qt. containers) in offices and industrial establishments.

Objectives uppermost in the development were simplicity of construction, ease of maintenance, and trouble-free operation. As an example, the refrigeration unit is installed in the base of the dispenser, where it is easily accessible for inspection. Also, when necessary, the unit may be readily replaced with another and the old one taken in for major repairs in the shop where proper facilities are available.

The dispensing units and coin changers—of which there are two—are likewise replaceable. This duplication gives added insurance. For, if one unit is not operating, or the storage space is empty, a light goes on and illuminates the "Use Other Side" panel located directly above the coin slot for this section.

Dispensers are so arranged that the top storage space (see righthand photo above) is operated by the coin changer on the right side of the unit. The lower space is operated by the coin changer on the left. Containers from either space are delivered to the slot in the bottom of the unit.

Operation of the unit is extremely simple. Containers of milk are stored on wide endless belts that move toward the sides of the machine—the top belt to the right, the lower belt to the left. At the discharge end of these belts, other endless belts, the width of a container, move milk toward the front.

Can Handle Other Products

When the coin, or coins, are placed in the changer, correct change is made, and a fractional horsepower motor is started. This motor moves the narrow belt forward until a bottle is discharged into the chute to the customer.

At discharge, the motor stops. When an entire row of containers is delivered from the narrow belt, a switch is thrown and the wide belt moves another row of containers onto the narrow belt, then stops.

There is an additional advantage, other than storage capacity, in the double compartment arrangement: Where sufficient demand exists for other products (such as chocolate milk or buttermilk), two different products can be dispensed from the same unit.

We Think . . .

■ Accelerated Progress Is Reflected in New Processing Equipment

New evidence of progress in important aspects of food processing were happily in evidence at the Atlantic City exposition of canning machinery. The trend to higher production rates and efficiencies was apparent. And one of the most amazing pieces of equipment at the show was the vacuum headspacer and capper which will handle 625 jars of baby food a minute. Unfortunately, there seems to be no filler which will keep up with this speed demon, though one has been developed to operate at 575 a minute.

Here is progress at a surprising rate. The earlier model of the capper, seen at last year's show, was considered phenomenal, with a capacity of 500 a minute. But the new one is 25 percent faster. It presents a challenge to filler designers and to the manufacturers of can seamers. And it can well serve as an inspiration to the manufacturers of all types of food plant equipment.

Speed is the essence of low-cost production, and processors are crying for equipment which will help them get costs down. Conversely, many equipment companies seem all too willing to rest on their laurels and continue to offer essentially the same machines as they were selling prewar.

A second gratifying trend is the increased attention to equipment with product-zone parts of metal which is corrosion-resistant and won't contaminate the product. Examples are corn mixers made of stainless steel and a corn filler with stainless steel heads. These are the answer to the the serious problem of discoloration in cream-style corn, recently discovered to be caused by contamination of the product with minute amounts of certain metals, such as copper.

It also is significant that the corn mixers are so designed as to eliminate pockets, sharp corners, and crevices in which material can lodge and cause an unsanitary condition. In this respect, the equipment is patterned after dairy-industry designs. It is evident that the dairy industry is contributing to progress in the canning, candy, baking, beverage, and other food industries.

A third encouraging trend is represented by improvements in instruments for controlling canning processes. Among these are timers on temperature controllers which convert them to true process-control instruments. Then there is a low-cost instrument for automatically venting retorts at a specified temperature, and also an attachment which gives very fast response by taking most of the time-lag out of a controller.

But from the aspect of the interchange of know-how between branches of the food field, the presence at the show of canning industry adaptations of the walking-beam spray-pasteurizer widely used in the brewing industry was significant. It can be used to spray cold water for cooling filled containers, or it will spray both hot and cold water in a two-stage operation. That is, it will sterilize the caps on jelly glasses and then cool the product. It is being used as a continuous freezer, too. In this instance it sprays refrigerated alcohol on cans of concentrated orange juice.

Progressive food processors not only are encouraged to see such improvements in equipment, but they will take advantage of the cost reducing and quality enhancing advantages which they offer.

■ Productivity of Office Workers Can be Increased, Too

In their efforts to cut costs, many food processors are very wisely overhauling their plant operations to step up the productivity of workers. But a lot of these companies are overlooking another phase of their operations where increased output per worker would result in worthwhile economies. We refer to office work.

In the food industries, the office worker has not kept pace with the factory worker in productivity. One reason is that more money has been spent to buy better equipment for the factory worker than has been invested in modern tools for the office worker. Likewise, more attention has been paid to advanced methods in the plant than in the Company office.

Since labor of any kind is too expensive to waste in these times, food industry executives might well consider these steps to greater office-worker efficiency:

Adopt systems of work measurement, supervisory training and job evaluation. Introduce work incentives, utilize procedure and system analyses, and simplify form design and handling. Lastly, put proper tooling in your offices.

Incidentally, if you have not attended a business machine show in recent years, you will be surprised at the number of office time-savers that are now available.

■ It Should Be Safe To Grow Big in Any Business

There now is a little more discretion in Washington's use of the New Deal concept that bigness is badness. But that is the philosophy which still prompts numerous blunderbuss attacks on enterprise. It certainly was the one which occasioned the antitrust suit against A&P.

It appears that the A&P case has backfired. The public does not want to see the government mess up an operation which has been influential in reducing the size of the family food bill. This makes any such crude attacks on bigness very unprofitable politically. And that may create a new element of caution in respect to Department of Justice action. At least our wishful thinking leans that way at the moment.

But basically the old issue has not changed. It remains politically expedient to favor small business and to attack large enterprise.

Few people object to the lending of a helping hand to small business. Certainly, we want to see the small firm prosper. But as it prospers it is likely to grow. So the government should not help it in its earlier years, only to turn around and penalize it because it becomes large.

There are, as a matter of fact, economic reasons why little companies should get bigger. To run any business today requires a highly specialized knowledge of many subjects. Labor relations and taxes are two problems which require close attention and skillful handling to avoid seri-

ous pitfalls. And the pressure continues for technological advances which not only improve quality, to gain wider acceptance for products, but also reduce production costs to meet inter-commodity competition.

As a company grows in size, it can afford the tax specialist, the competent labor relations executive, and the essential managerial and technical skills.

To sum it up, bigness is not badness, but rather is goodness because it contributes to progress. So small companies should be encouraged to grow and should not be persecuted after they become large. Maybe the reaction to the attack on A&P will make the government more sensible in its attitude toward business. If so, small business—as well as big—owes A&P a debt of gratitude.

■ Central Prepackagers Should Guard Against Pitfalls

Energetic, but technically uninformed, central prepackagers are going in for the production of prepacked fresh meats. But before embarking on a commercial-size venture, they should give a lot of attention to efficient layout of the operations, sanitation, proper selection of packaging materials and protection of quality.

The fresh meat prepackaging business is due for tremendous activity. Stores handling prepackaged meats are increasing by leaps and bounds. But unless those entering this field exercise care and foresight, their chances—and the chances of those large packers who eventually come up with a good package and product—will be impaired. This field is not unlike the frozen food business several years ago—particularly the precooked frozen food field—when some operators sought an easy dollar by flooding the market with inferior and poorly packaged products.

All along, some of the large packers have worried, and with justification, about the retailer who packages behind the counter or in a separate room in the store. They have feared that this retailer would put inferior packages and products in his self-service display case and thus set back the prepackaging trend. These large packers were afraid that the retailer—and now the central prepackager—would not trim the meats properly (give the consumer too much fat and bone), would use low-grade meats, and would short-weight consumers. And some prepackagers did make these mistakes.

Fortunately, aid is available to the small prepackagers from technologists with some of the large packers, the Department of Agriculture, and some of the universities with food research facilities. Suppliers of packaging materials and machines also are lending a helping hand. The prepackagers will be well advised to take advantage of this know-how.

■ Lighting—Like Other "Tools"—Should be Modernized

So commonplace is lighting that one often overlooks the advantages that can be obtained from improving it. Some may not be aware that lighting intensities that were considered good ten years ago are no longer adequate. Wartime experience showed that more foot-candles are an investment which pays off in more production, better work, higher employee morale and fewer accidents to workers. And in food processing plants, good lighting—like white tiled walls—has the effect of increasing sanitation because it shows up the dirt.

A light meter in a well-illuminated factory today will read 30 to 35 foot-candles. And for very close work, this will be supplemented by additional light spotted on the operation. In fact, good lighting these days is about twice as bright as before the war. So if your factory has not stepped up the level of its illumination, you may be overlooking an opportunity for improvement in your operations.

Most of us realize that proper lighting of operations is essential to maximum productivity of workers and to precision in quality grading, and the like. It is easy to see that bright light shows up spilled material or refuse in the corners or behind machines. And one can visualize the improvement in working conditions which comes from illuminating a factory brightly enough to make it cheerful.

But some do not appreciate the importance of good lighting in preventing tripping, head bumping and other types of collision accidents. Still fewer understand that lighting for safety is important in the little-used areas, where the very strangeness of the place makes it hazardous for employees. Attention to these and other details of lighting for safety pays off in curtailment of lost time and in cheaper compensation-insurance premiums.

All in all, food processors should not take lighting for granted. They should examine it critically as they would any tool which plays an important part in the cost and efficiency of their operations.

■ New Method of Treating Waste Sets Example for Industry

Have you heard about the new triple-benefit waste treatment for the beet sugar industry, announced by Massachusetts Institute of Technology? It not only is of importance to beet sugar producers and users, but represents a type of progress sorely needed throughout the food field.

Here's what it would do if adopted by all the nation's sugar beet mills: Save more than 20,000 tons of sugar a year, eliminate a source of pollution involving 3 billion gallons of water annually, and reduce by about 30 percent the amount of fresh water required by the mills.

Here's how it works: A very small amount of chlorine is dissolved in the process waste water. This not only destroys bacteria, but acts chemically to make possible rapid separation of non-sugar impurities. And the small concentration of valuable sugar remaining in the water can be recovered, since the chlorine-treated water may be reused for extraction instead of being discharged as waste.

Here are the economics of it: Preliminary studies, according to Dr. Clair N. Sawyer, associate professor of sanitary chemistry at MIT, indicate that savings during the first year of operation should pay the cost of the new treating equipment required.

This amazing development comes out of the MIT laboratories and is now in use in two sugar beet factories, one in Ohio and one in Michigan.

It shows the great benefits which can result from research into the treatment of wastes, currently one of the most worrisome problems facing the food processing industries.

PRACTICAL IDEAS

Handling Pulp Needn't Be Messy

Workmen's comfort as well as condition of plant and equipment are greatly improved by a simple device to aid handling of free-flowing pulp materials.

To state the case, apple peels and undersized apples are crushed to a soupy pulp in a hammer mill at the Fisher Spiegel Co. plant in Geneva, Ohio. From the bottom of the mill, the free-flowing mass is fed directly to filter cloth-covered racks in preparation for hydraulic pressing. And frequently in this transfer the pulp had splattered on the workmen, equipment and floor.

But today this condition has been corrected by adding a special stainless steel sleeve to slide up and down on the delivery pipe from the hammer mill. This sleeve features an inverted funnel-shaped bottom that not only prevents splattering but also provides a means of control in spreading the pulp. Raised and lowered by a pair of ropes working through pulleys attached to the ceiling, the sleeve is operated by the same workman who controls the valve on the delivery pipe.

The funnel is first lowered until it rests on the cloth over the press racks. Next, the delivery valve is opened and the pipe, sleeve and funnel fill with pulp. Then, as the sleeve is raised, the pulp flows from under the edges of the funnel and is readily spread over the surface of the filter rack without splashing or loss of pulp.—*Ivan C. Miller, Editorial Consultant, "Food Industries."*

Banish Those Rest Room Odors

In men's toilets in industrial plants, the most common source of odors is the urinal fixture.

The old stall type, recessed in the floor, entails a major maintenance problem because of clogging caused by the inerustation of salts in the drop pipe in which decomposing organic matter is retained.

No amount of disinfectant or deodorant will correct this condition. But it can be simply dealt with by using a rubber bladder and an air pump to seal the drain at the trap while an acid cleaner is applied and held in the drain long enough to dissolve the scale.

A suitable brush can then be used to free the pipe, and the odor is gone, provided the fixture is otherwise clean. Incidentally, a properly maintained and ventilated toilet room requires no deodorant.—*From a paper presented at the First Plant Maintenance Show by J. Lloyd Barron, Sanitary Engineer and Manager, Sanitation Department, National Biscuit Co., New York.*

$25 EXTRA FOR BEST ITEM

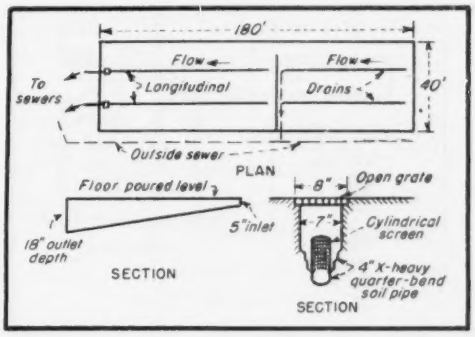
You are invited to submit items for this "Practical Ideas" department. You will be paid at regular rates when your item is published, and if it is judged the best for the month, you will receive additional pay of $25.

Selection of the best contributed item will be made by a group of 200 readers each month, and the name of the author and item title will be cited in these pages in a subsequent issue.

"Practical Idea" items may describe any type of device or method recently developed to solve a problem, speed an operation, or make some task easier. The item may concern factory, laboratory, warehouse, or power-plant operations in the food industry. "Practical Ideas" pertaining to management, maintenance, and trucking or shipping also are suitable.

You need not be an experienced writer or draftsman to submit "Practical Ideas" items. The text will be edited and sketches converted to finished drawings.

Send your items to: "Practical Ideas" Editor, FOOD INDUSTRIES, 330 W. 42nd St., New York 18, N. Y.



Trough Drains Pay Dividends

Sanitation has been improved, cleaning operations simplified, and clogging risks eliminated by the installation of open, grate-covered longitudinal drains on the ground floor of Halter's Pretzels, Inc., plant, recently completed at Canton, Ohio.

Use of these drains running the entire length of the

BEST ITEM—Voting by reader-judges on Practical Ideas in January FI names as best the item, "Now They're Stacked Up-side Down"—a case-handling method that reduced breakage. —The Editors

plant, permitted the floor proper to be constructed level—most desirable from an operating and safety standpoint. It eliminates the "saucer" effect in floors, required when individual drains are installed at various points in the floor area.

Now, the worker in cleaning can sweep from any point on the floor to a longitudinal drain. This is much faster than sweeping to the saucers, thus saving man-hours in the cleaning operations.

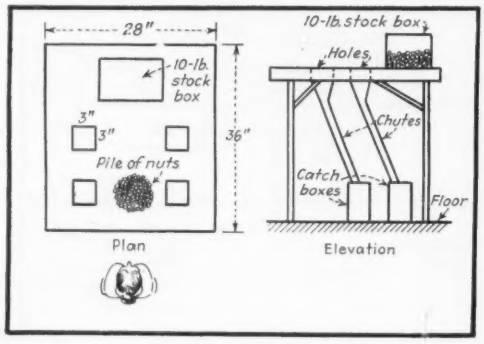
Further, the possibility of water collecting on the working floor is eliminated—for if a drain ever clogs, the water is merely backed up in the trough, and not on the floor.

The plant, approximately 180 ft. long x 40 ft. wide, has a concrete floor. There are two rooms, one roughly 105 ft. in length, the other 75 ft. long. Two concrete troughs are set in each room, tri-secting the areas. These troughs are 7 in. wide and run the entire length of the rooms. Bottoms of the troughs are sloped ⅛ in. per ft. toward one end of the building. At the higher end, the trough has a depth of 5 in. sloping to a depth of 18 in. in the 105 ft. room.

Inserted at the bottom of the outlet end of the trough is a 4-in. quarter-bend extra-heavy soil pipe, with the bell end up (see drawing).

A cylindrical metal screen is fitted into the bell end of the soil pipe. The screen is removable for cleaning and to permit disposal of collected solids. Costly repairs caused by clogged drains are thereby eliminated by this method.

Over the 7 in. troughs an open steel grating 8 in. wide is laid. The grating used in this job is constructed of ¾ in. x ⅛ in. bearing bars spaced at 15/16 in. centers and ⅝ x ⅝ in. cross bars spaced at 4 in. centers. Made in sections, 4 ft. long, the grating can be readily removed for cleaning the trench.—*James L. Dooley, Halter's Pretzels, Inc., Canton, Ohio.*



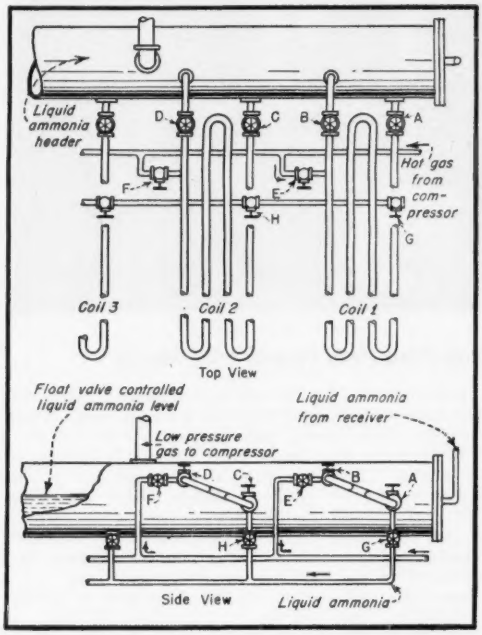
Nut Sorting—Simpler and Faster

Time and motion studies, at the S. F. Whitman & Son candy plant in Philadelphia, have led to the development of a highly efficient time and labor saving method of sorting the various nut meats, later employed in the company's confections.

In the old sorting, the operator worked from a 10-lb. stock box of nuts within easy reach of her table. She would spread the nuts in front of her, then put the small ones in a box on her lap and pile the large ones at the far left of the table. Broken pieces went into a box on a chair to her right, and foreign matter was piled on the table at her immediate left.

In the new system, the 10-lb stock box is still retained, and the operator continues to work from a similar pile of nuts—but the sorting has now been simplified by a new table featuring four 3-in.-sq. holes as shown in sketch at beginning of item.

Now the operator simply pushes the small nuts, large nuts, broken pieces, and foreign matter from the pile to their respective holes. They drop through and are chuted directly into separate collection boxes on the floor under the table.—*FI staff.*



Defrosts Coils Without Effect on Room

Coils can be defrosted, without changing room temperature or melting frost, by a method used at Lehigh Valley Dairy, Allentown, Pa.

Referring to drawing, to defrost Coil 1, valves A and B are closed and valves G and E opened. This isolates Coil 1 from the liquid ammonia header. Hot compressed gas piped from the line between compressor and condenser enters Coil 1, forcing the liquid ammonia in the coil to discharge through Valve G into Coil 2.

As the hot gas replaces the refrigerant, frost is loosened from coil. Tapping the coil with a pole causes the frost to drop to the floor without melting. While Coil 1 is defrosting, the remaining five coils maintain temperature requirements in the room.

When the frost is removed from Coil 1, Valves E and G are closed and Valves A and B are reopened. Coil 1 now again becomes operative. Any of the remaining coils may be defrosted in the same manner without temperature change in the room.—*FI staff.*

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs. pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods. Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

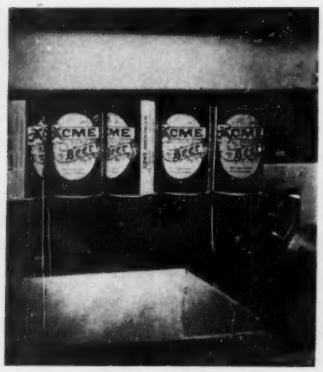
75 pounds in a single stage.

NASH ENGINEERING COMPANY

31 WILSON, SO. NORWALK, CONN.

Food Equipment News

Plows open cases . . .



. . . magnet holds cans . . .

. . . each travels separate way

New Unit Uncases Empty Cans Automatically

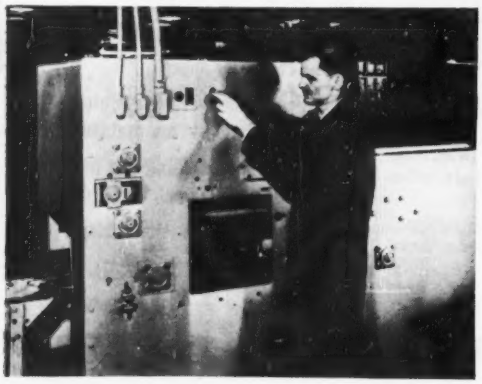
Work of the two or more men formerly required to remove empty cans from cases is now completely eliminated by a new uncaser.

This machine automatically opens single-layer cases, removes the empty cans, deposits them on a conveyor line, and places the empty case on another conveyor leading to the casing machine.

This development makes possible a production line whose speed is not limited by manual dexterity or the continuous presence of operators.

Simple in design, the new uncaser is reported to operate with a minimum of trouble, and it requires little maintenance. It has been operated at speeds up to 25 cases (900 cans) per min. and can be adjusted to the speed of any existing line.

Removal of cans from cases is a "straight-line" operation. Just as they are received from the can company, the single-layer cases enter the line from warehouse or car on a conventional conveyor. A blocking device automatically spaces their entrance into the unit, where they are picked up by flight bars and carried forward at constant speed.



Push of button starts empties through

A single rubber roller on each side of the uncaser exerts a slight pressure on the case, "popping" up the large side flaps. Then a plow opens and folds the flaps against the outside of the case.

As the case continues its travel, the small end-flaps are raised by a simple mechanism. One narrow finger moves down between the cans and raises the back flap, holding it open while the case progresses through the machine. Two smaller fingers move forward in the same manner but at a rate exceeding that of the flight bar, thereby opening the front small flap and holding it down until it passes below a belt.

These fingers (two for the front and one for the rear flaps) work from two cross bars. Their action is synchronized with the forward travel of each case to insure positive lifting and holding of the flaps until the case passes beneath an electro magnetic conveyor, that removes the cans without interruption. The magnet holds the cans firmly against the overhead belt conveyor while the case drops free onto a conveyor below, which carries it to the caser.

Cans continue to move forward, held by the magnet, until a second belt picks them up from below. The cans are then free to be deposited on a single-line conveyor, or passed through a conventional unscrambler.

A complete system of automatic controls prevents operating failures or difficulties with the uncaser. Automatic interlocks, switches, and other devices, have been incorporated where necessary. For example, if for any reason the case does not immediately drop free from the cans (as they are held against the magnetic conveyor), the machine stops instantly. When the case then does drop to the empty case conveyor, the machine automatically resumes operation without attention.

Another interlock switch system stops the machine if one of the flaps does not open. Each plow for opening the side flaps is equipped with a switch which is actuated when the flap is opened. Unless the switches on both plows are actuated, the machine stops.

To prevent the machine from "coasting ahead' after it has

been turned off, and thereby possibly jamming a case, the motor is equipped with a zero speed switch which halts the machine instantly. Any defective carton can be quickly and easily removed from the uncaser.

The machine is simply installed in virtually any existing can line, and it requires only a minimum of space. The equipment is 8 ft 3 in. long, 5 ft. high, and 27 in. wide.—*Bruce Engineering Corp.*, 417 *Montgomery St., San Francisco.*

Electric Steamer Is Compact, Portable

Live, high-temperature dry steam (320 deg. F.) for sterilizing flour milling and feed plant equipment, as well as grain stocks, is provided by a new electric steam generator.

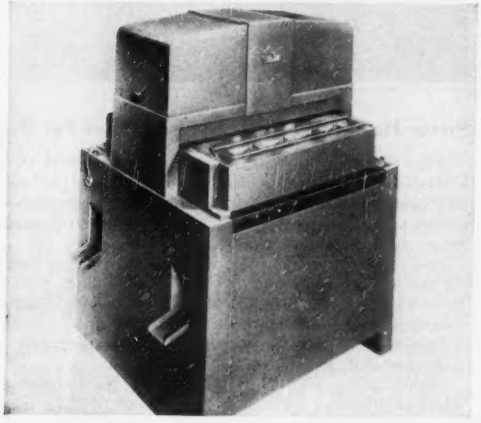
It can be operated either as a portable or stationary unit. Three electric units, completely immersed, heat the water to generate steam.

The steamer is compact, easy to install, simple and economical to run, and features automatic safety controls. An all-steel, cabinet fully encloses the entire unit. It occupies a floor space 48 x 12 in. (2 in. wider with wheels for portable unit) and is 36 in. high on vehicle.

To install, the water hose is simply connected to water tap, and the electric cord to an outlet. No flue is required for inside operation.

To operate, the switch is thrown, there is an adjustment for desired pressure, then in 10 to 15 min. there is a full head of live, dry steam up to 100 lb. pressure, at 320 deg. F. Automatic controls keep the boiler at pre-set pressure.

All boilers are inspected by ASME, and all electrical equipment is listed by Underwriters' Laboratories.—*The Wolf Company, Chambersburg, Pa.*



Packaging Machine Seals Electronically

Bags made of thermoplastic film are sealed electronically under vacuum or gas by a new packaging machine.

Film as thin as 1½ mils (0.0015 in.) can be sealed at the rate of 20 packages per min.

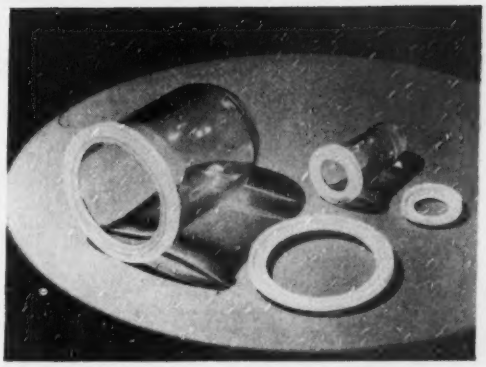
Two sets of sealing bars are used, with separate oscillator circuits, each rated at 1500w. output of high frequency current, to effect the sealing operation. The power supply is in a separate cabinet adjacent to the machine.

Operator places bags in the cavities shown, presses a starter button, and the rest of the cycle is automatic. To achieve maximum speed, two operators may be used.

At the beginning of the cycle, the vacuum dome is raised to clear the tops of the packages. The cavities are carried in the platen, which "shuttles" back and forth. When the starting button is pushed, the cavities advance to a position under the vacuum dome. Then the dome comes down and seals off the cavities. A vacuum is drawn and, if desired, nitrogen is injected into the chamber. A seal is made and the dome is raised. Packages are then ejected from the machine and may be intercepted by conveyor or tote box.

Electronic controls are so interlocked that if platen is away from operator the starter button on that side of the machine is inoperative, thus the machine only works when the operator who is loading touches the starter button.

Unit is 36 in. front to back, 40 in. wide, 36 in. to top of cavities, and 56 in. total height.—*Electronic Products Corp.*, 135 *So. LaSalle St., Chicago*, 3.



Snap-On Gaskets for Glass Pipe

These self-centering, non-corroding and also non-contaminating snap-on gaskets are specifically designed to accommodate deflecting and misalignment in assembling sections of conical-end glass pipe. They assure a smooth, uninterrupted flow of materials in the pipe. Gaskets are made of Teflon, new du Pont material.—*United States Gasket Co.*, 602 *N. 10th St., Camden, N. J.*

DON'T MISS THESE . . .

Sugar mill for crushing cane employs roller bearings, features lighter weight ..... Page 92

Citrus juice concentrates are now frozen continuously and automatically in new unit..... Page 94

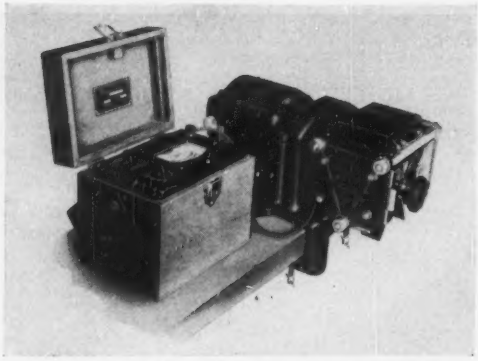
Accumulating table with power unit enclosed is notable for its clean design..... Page 95

Device fills drums to correct weight. Automatic unit is air operated ..... Page 96

AND WATCH FOR . . .

Air-operated device cleans cloth filter screens without shutting down unit ..... In April FI

Centrifuges feature external control of solids discharge and consistency ..... In April FI

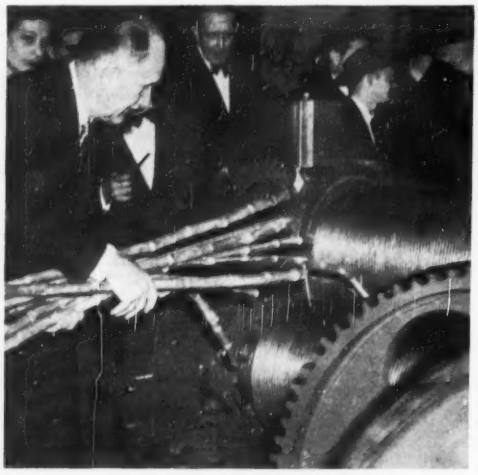


Peanut Moisture Measured Quickly

With a new instrument, moisture content of peanuts can be determined in seconds.

It's done with the Tag-Heppenstall peanut meter, which requires no weighing of samples before testing. This is termed the first peanut-moisture meter to employ the principle of conductivity as a method of testing. Calibrated for the most popular varieties, including Virginia-Carolina, Spanish and Runner, it can be used with either whole or shelled nuts.

In addition to being useful for determining the best time for harvesting, the meter will be of interest to candy manufacturers, bakers, food packers, peanut oil processors, and warehousemen.—*C. J. Tagliabue Corp., 64 Frelinghuysen Ave., Newark 5, N. J.*



Sugar Mill Targets Weight and Costs

Comparatively lower costs are reported possible with the use of a new, lighter cane sugar crushing mill that employs roller bearings.

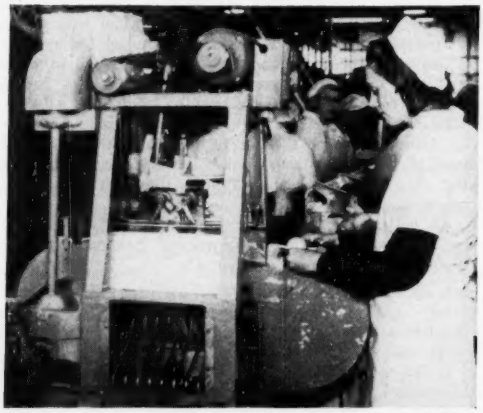
Sugar mills heretofore have been of heavy construction, with large gears and flywheels required to crush the largest possible volume of juice from the coarse tropical cane.

The new unit is stated to mark a significant advance in the design and manufacture of sugar milling machinery. Mechanical innovations are listed as: Elimination of friction losses through use of the roller bearings; use of crown gear wheels burned by flame torch from solid high-carbon-steel billets; and use of beveled gear drives to obtain savings in floor space not possible with present requirements of spur gear drives.

Weighing approximately 20 tons, the machine is 27 ft. long, 6 ft. wide and 5 ft. high. It consists of a series of three groups of three large grooved metal rollers, measuring 16 by 20 in. each and mounted on two self-aligning spherical roller bearings.

The bearings are protected by special housings with labyrinth seals. Drive shafts are supported on six large pillow blocks, each enclosing anti-friction bearings. The mill is driven by a 50-hp., low-speed electric motor.

Crushing capacity of the machine is put at 150 tons of cane per day. Collaborating in the development of the unit were engineers of the following three companies—*Kelvin Engineering Co., N. Y. C., designer; Derrick & Hoist Co., Inc., N. Y. C., builder; and SKF Industries, Inc., Philadelphia, bearing maker.*



Pitter Handles 5,000 Lb. of Peaches Per Day

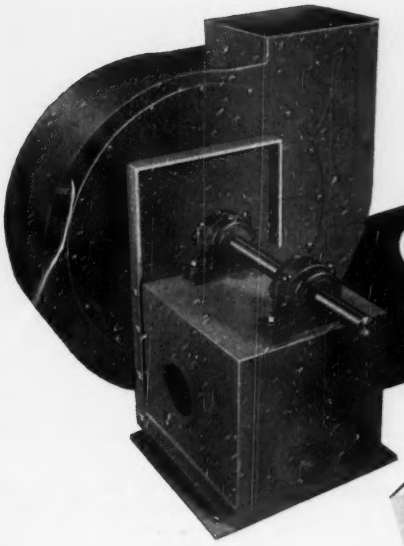
After five years of experimental and development work, a revolutionary Freestone peach pitter has been perfected. The machine is reported capable of saving thousands of dollars annual for packers of baby food, preserves, canned, frozen and dehydrated peaches.

Production figures show that with this machine one operator can handle upwards of 100 bu., or 5,000 lb. of peaches in an 8-hr. day. This is about 350 percent more production than by existing hand methods.

Packers of apricots, nectarines and prunes expect to make use of it, too.

Peeled or unpeeled fruit is manually fed to machine, which is otherwise automatic. There is no tripping mechanism to divert the operator. Normal speed is 48 peaches per min. Fruit is carried to knives that cut evenly and smoothly through the flesh, following contour of the pit. There is no bruising or tearing. Halves and pits are discharged separately, while the operator works in safety and without fatigue.

Corrosion-resistant materials are used throughout, with stainless steel at all points of contact with fruit. A totally enclosed motor transmits power through a sealed drive unit running in oil. Machine can be thoroughly cleaned with steam or water under high pressure.—***Boutell Manufacturing Co., 506 Lyell Ave., Rochester 6, N. Y.***



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GETTING RID OF Dust Fumes, Grit, Smoke, Moisture

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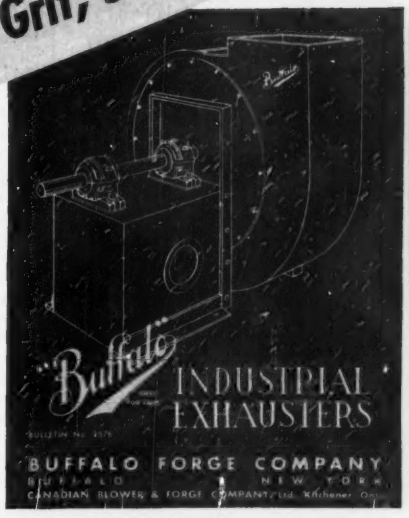

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"Buffalo" FIRST FOR FANS

New Pharmaceutical Laboratories Air Conditioned with Frick Refrigeration

Baxter Laboratories, which have the largest production of intravenous solutions and blood transfusion equipment in the world today, use two Frick NEW "ECLIPSE" compressors for cooling the offices, research departments, and many work areas in their recently completed plant at Morton Grove, Ill.. This covers 300 by 400 ft. Frick installation made by Midwest Engineering and Equipment Co., Sales Representatives in Chicago.

Office and Plant are Modern Throughout

One of the Air Conditioned Laboratories

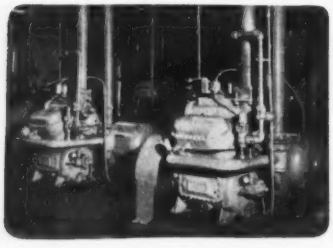
Assembling Expendable Transfusion Sets

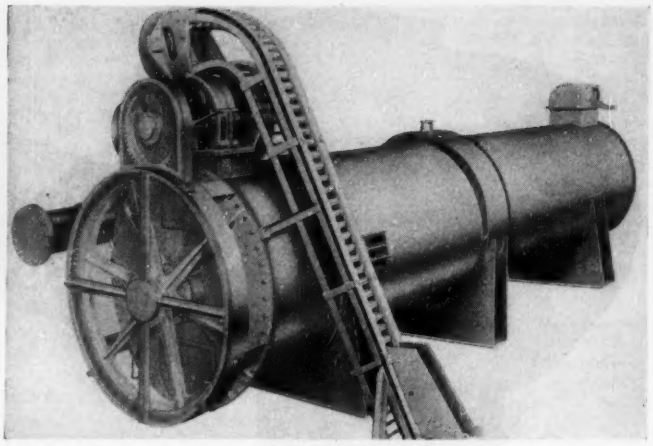
When you want dependable air conditioning, refrigerating or ice-making equipment, engineered to your special needs, look to

FRICK CO.
WAYNESBORO PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery

Two Frick NEW "ECLIPSE" Compressors





Citrus Juice Concentrates Frozen Continuously

Canned citrus juice concentrates are frozen continuously and automatically in a recently developed machine. This equipment is also termed applicable to efficient freezing of certain other food products.

An important advantage reported for the unit is elimination of large crystals in the concentrates, commonly manifest with slower, non-agitating methods.

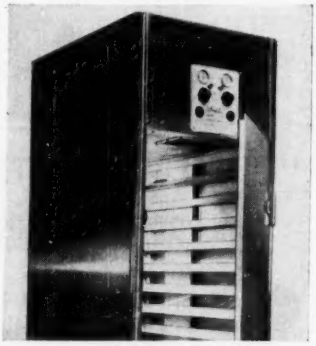
In appearance and operation, the new freezer is similar to a continuous pressure cooker. Freezing is accomplished rapidly by means of an internal circulating system utilizing a special refrigerant fluid. Refrigerant flow is arranged to effect a highly desirable, quick heat transfer. The refrigerant is carried from the machine, through a heat exchanger, and back into the freezer via a pump.

Canned products are introduced to freezer by a positive feed elevator which carries containers into a turret at top of machine. From the turret, cans are automatically aligned within the unit on a specially constructed reel positioned inside a helical shaped track. Rotation of reel causes cans to progress rapidly and smoothly along track spiral through freezer.

Exhaustive tests have indicated that the continuous and automatic features provide highly significant savings in time and handling costs. Rapid freezing during agitation of cans is stated to result in a completely and uniformly frozen product.

Principal installations made to date are for popular size cans of orange concentrate. They handle up to 300 cans per min.

Constructed as a self-contained unit, the new freezer is easily installed, occupies a minimum of floor space, and does not require an insulated room.—*The Anderson-Barngrover Div., Food Machinery & Chemical Corp., San Jose, Calif.*



All Electric Proof-Box Has Auto-Controls

Temperature and humidity are automatically controlled by sensitive sealed-in instruments in a new line of all-electric cabinet proof boxes.

Unit illustrated is the smallest of four sizes. With metal-clad construction throughout, it is fully insulated, to prevent heat losses and condensation.

The air conditioner, blower, housing, ducts and electric heater are of stainless steel. Water is automatically fed to the electric humidifier and tank of wet bulb wick. Automatic electric heater has nichrome elements.

Cabinet can be used where closely controlled temperature and humidity conditions are a must. Instrument panel holds the Weston wet and dry bulb stainless-steel thermometers, red

and green indicator lights, control knobs, and blower and control switches.

Boxes can be furnished in a lustrous white baked-on-enamel, gray baked-on Hammerloid, or stainless-steel finish.—*Anetsberger Bros., Inc., 180-P.N. Anets Drive, Northbrook, Ill.*

New Accumulating Table Gives Many Advantages

Numerous features mark a new 36 in. rotary accumulating table recently designed. Cleanliness and attractiveness of the new unit are particularly notable.

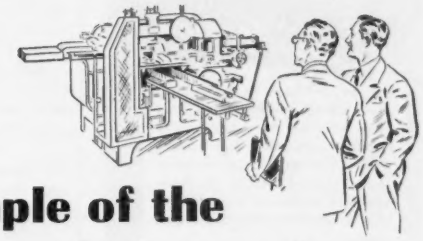
The table is constructed of fabricated steel electrically welded and finished in white with stainless steel trim on the corners. The power unit, completely enclosed, is made up of a ½ hp. motor with a belt driven speed reducer that increases the pulling

(*Turn to next page*)

Oven Checking Simplified

A tester for checking thermostat indications of gas and electric ovens against actual oven temperatures has now been redesigned for portability and new ease of operation. Unit has a scale range of 0 to 650 deg. F.—*General Electric Co., Schenectady 5, N. Y.*

OUR SAVINGS ON LABOR ALONE WILL PAY FOR THIS MACHINE IN 8 MONTHS TO A YEAR!



...an example of the savings made by modern "PACKAGE" machines

The statement quoted above was made by a manufacturer who had recently installed one of our wrapping machines. In his case, the machine eliminated many hand operations, making a striking saving in labor costs. It also resulted in a considerable saving of packaging material.

Many executives are not fully aware of the economies that modernization of their packaging departments would make possible . . . A survey of their present equipment and a comparison with the performance of new machines is to them a real eye-opener!

Consider, for example, the savings and added production flexibility offered by a new wrapping machine operating at 100 packages a minute as against an old model doing only 60. You'll undoubtedly find, too, that the new machine consumes less wrapping material . . . That a saving is made on damaged cartons, due to its use of automatic overload releases. Change-over time for different sizes has also been shortened—some models, for instance, require only a few hand-wheel adjustments . . . The insertion of a new roll of wrapping material has been simplified. Valuable man-hours are saved every day.

So we suggest that if you are seeking new savings, look into your packaging methods. Better still, do it with the assistance of a "PACKAGE" representative. You'll find him well informed on all phases of packaging and in the factors that make a packaging dollar go further.

Write for our leaflet "Packages that Sell"

PACKAGE MACHINERY COMPANY
SPRINGFIELD, MASSACHUSETTS

NEW YORK CHICAGO BOSTON CLEVELAND ATLANTA DALLAS
DENVER LOS ANGELES SAN FRANCISCO SEATTLE TORONTO MEXICO, D.F.

KLENZADE

COMPLETE PROGRAM

For Food Plant Sanitation

Save pay-roll hours by streamlining your clean-up operations and using more effective lower-cost-per-job cleaners, detergents, and bactericides. Eliminate waste materials and unnecessary effort. A Klenzade field technician will help you plan a complete integrated program.

KLENZADE HC-6 Cleaner

Scientifically balanced high-efficiency soapless cleaner. Contains wetting agents and special polyphosphates for general cleaning. Softens hardest water.

STER-KLEEN KLENZADE LC-112

Fast-working organic acid detergent compatible with all quaternaries. Removes lime film on stainless steel, glass, tables, etc.

STER-BAC KLENZADE S-12

Outstanding powerful quaternary. Sustained bactericidal action. For deodorizing and disinfecting in food plants.

44 Branch Offices and Warehouses

Write us about Klenzade Field Technical Services and plant cleaning programs. No obligation.

KLENZADE

KLENZADE PRODUCTS, Inc.

BELOIT, WISCONSIN

power of the unit to handle many feet of bottle chain.

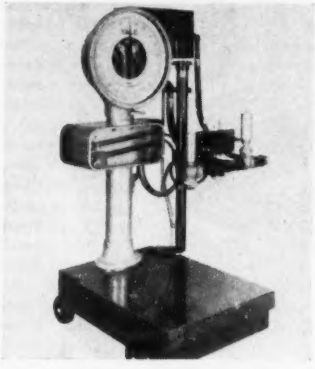
A friction wheel turns the table operating on the same shaft. The motor has a Hi-Lo pulley, and by means of a slide, variable speed of the table is possible. Speeds of the outer edge of the table and conveyor chain are alike, giving smooth bottle transfer.

Variable speed adjustment permits use of all sizes of bottles by synchronizing bottling line with speed of any filler.

Since the power unit requires only half the space under the accumulating table, an enclosed shelf is made available, 22 by 26 by 12 in. high. Cabinet is an ideal location to store grease, lubricating materials, and attachments used for different size bottles, as well as small tools needed daily.

Square construction of table gives it weight and stability. Legs have adjustments to raise or lower to conform to bottling line, where used. When right height is reached, legs are locked by set screws. Ample space under table makes it easy to keep clean.

Construction of guide bar on infeed and conveyor attachment enables either left or right hand setup. To change from one to the other, operator takes out guide bar circle and reverses. Minimum of moving parts gives long service and low upkeep.—*Keenline Equipment Corp., Oshkosh, Wis.*



Device Fills Drums To Correct Weight

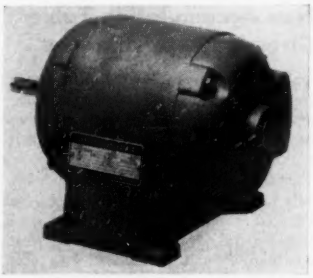
Syrups, oils, and other liquid food products, can now be filled in drums to the proper weight with a new air-operated device.

Mounted on a scale, the automatic air-operated device operates in the following manner: First, an empty drum is placed on the scale platform. Next, tare beam poise is moved until dial indicator points to net weight of material desired. Valve assembly is now lowered (by air) to drum bung hole, and start button is pushed, bringing flow of liquid. Device automatically cuts off when desired weight is reached.

An air line is all that is required to operate the scale. Pressure should be between 80- and 150-lb., preferably 100-lb. Unit fills drums fast. For example, it handles a 52-gal. drum with SAE 30 oil at 95 deg. F. in 49 sec. Flow of material can be regulated to suit material and the operation.

Since no electrical equipment or attachments are required, device operates safely under the most hazardous conditions.

Simple operation makes it possible for one man, unskilled, to handle one or two units.—*The Yale & Towne Mfg. Co., Roosevelt Blvd., and Haldeman Ave., Phila.* 15, *Pa.*



Compactness Featured In Capacitor Motor

Wherever power supply demands single-phase operation, a new integral hp. capacitor motor may be used.

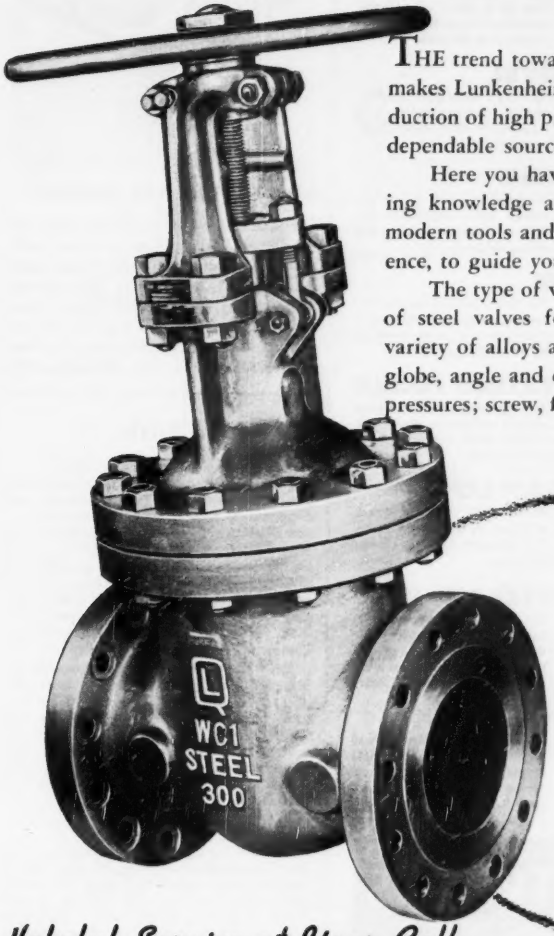
To minimize over-all dimensions, capacitors are mounted in base of motor, and there is no conduit box on side. It has been replaced by a built-in terminal board inside the end shield for easier wiring.

New capacitor motor is compact and lightweight, weighs 15 to 20 per cent less than old model. It has a totally enclosed built-in starting switch to keep foreign matter from the contacts, and a completely new and tested centrifugal mechanism designed for a long, dependable life.

In ratings from ½ to 5 hp., these torque motors are available in two types: Type KCS, capacitor-start, and Type KCR, capacitor-run. According to G-E engineers, these differ only in starting current, not in output characteristics. Type KCS motor is designed for 115/230v. while Type KCR motor is a single-voltage, 230v. design.—*General Electric Co., Schenectady 5, N. Y.*

FOR *Steel Valves* YOU CAN'T GO WRONG ON LUNKENHEIMER

This mark on steel valves is your assurance of highest quality



THE trend toward wider use of steel valves for many services makes Lunkenheimer, who pioneered the development and production of high pressure-high temperature designs, a logical and dependable source of supply.

Here you have top metallurgical research, sound engineering knowledge and design, advanced foundry practice, most modern tools and manufacturing equipment, plus wide experience, to guide you in the selection of your requirements.

The type of valve illustrated is only one of a complete line of steel valves for every industrial purpose. Available in a variety of alloys and trims to suit specific applications . . . gate, globe, angle and check patterns, 150 lb. to 2500 lb. and higher pressures; screw, flange or welding ends.

300 lb. CAST STEEL GATE
Fig. 1938-WD6

Body and bonnet are of Carbon Molybdenum Steel to provide for higher pressure-temperature operation than the limits prescribed for carbon steel. Disc and stem are stainless steel, seat rings high tin content nickel alloy developed by Lunkenheimer—a fine-wearing combination for steam up to 850° F., and general service on water, gas or air.

Lunkenheimer design and construction insure all the essentials for satisfactory and low-cost service.

Helpful Service at Your Call . . .

Lunkenheimer representatives and sales engineers will be glad to work with you on any problem of valve installation and usage. And for your immediate maintenance requirements, call your Lunkenheimer Distributor. He is well qualified to take care of your needs.

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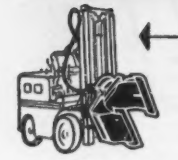
Leadership Through Achievement

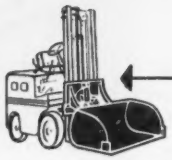
CLARK Attachments

MAKE THE CLARK FORK TRUCK "MANY MACHINES IN ONE"



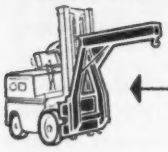
ROTATING ROLL CLAMP

Picks up a roll in either horizontal or vertical position and rotates it to the other



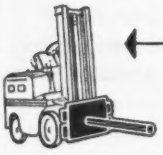
SHOVEL

For easy pick-up and dumping of sand, cinders, gravel, coal, aggregate and other bulk material



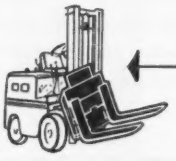
CRANE

For handling many large, unwieldy items unsuitable for forks and pallets; usually used with a chain



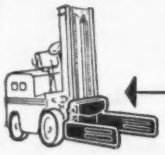
RAM

Handles coiled material, spools, castings and many fabricated units with openings to admit the ram



ROTATING FORKS

For handling and dumping special containers filled with scrap, bulk material and similar loads

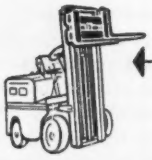


CLAMP LIFT

For handling a tier of boxes or cases, by gripping the bottom unit firmly between clamping arms

BARTEL DEVICE

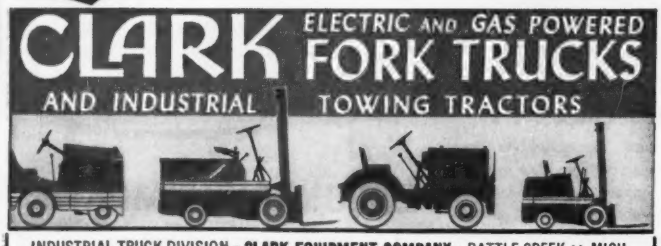
For handling paper rolls—a core pin, hydraulically actuated, enters the top of the roll, and holds roll securely against a curved clamp-plate



HI-LO-STACK

Free lift of more than 5 feet without increasing overall height; more than average tiering height and low clearance height

Use the Coupon to get Material Handling News worth reading



INDUSTRIAL TRUCK DIVISION • **CLARK EQUIPMENT COMPANY** • BATTLE CREEK 14, MICH.

Please send the items checked . . . without obligation ☐ Condensed Catalog ☐ Material Handling News

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Improved Magnetic Separator

Circumferential pole design for uniformity of magnetic field across the drum width, adjustable dual-purpose leveler, and burden feed control are features of a new permanent drum-type, non-electric Alnico magnetic separator. Unit is used for removal of tramp iron.—*Dings Magnetic Separator Co., 4740 W. Electric Ave., Milwaukee, Wis.*

Equipment Briefs

Turbo Cooler

Uniformity of cooling, intermittent turning over of materials, spreading, and gentle handling are advantages reported afforded in a new Turbo Cooler. These are especially applicable in the cooling of free flowing, granular, or powdery solids. Steel, stainless steel or aluminum are used in the parts coming in contact with material to be cooled.—*Wyssmont Co., 3104 Northern Blvd., Long Island City 1.*

Container Dispenser

Nestyle-type containers from stacks are dispensed by an automatic machine which supplies them to the filler operator, one at a time, properly spaced on the conveyor line. Machine is set to supply 55 containers per min., but it may be adjusted to a slower rate. It operates on a 1/6 hp. motor and occupies 3 ft.-8 in. x 2 ft. floor space.—*Sealright Co., Inc., Fulton, N. Y.*

Case-Printing Unit

For printing of corrugated shipping cases, an improved automatic imprinter uses specially designed foam rubber type faces that follow case contours and eliminates fadeouts. A wide variety of printing combinations in sizes from ¼ to 1½ in. high is afforded. Case range includes: Lengths 12 to 23 in., widths 8½ to 14½ in., heights 3 to 18 in.—*J. L. Ferguson Co., Joliet, Ill.*

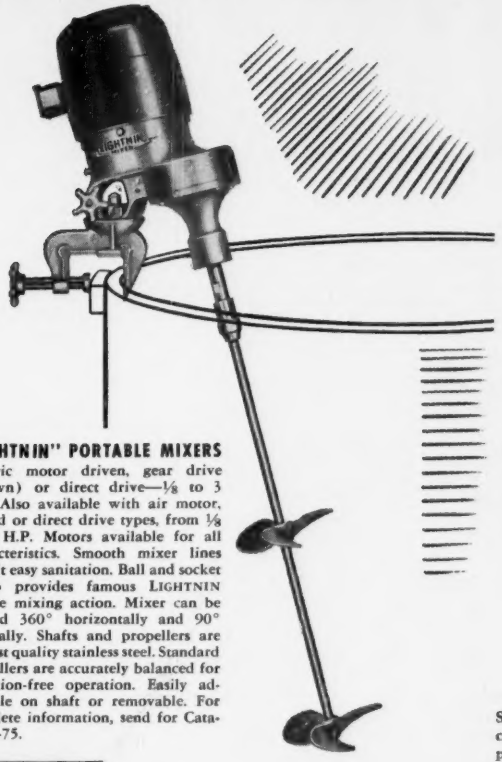
Redesigned Viscometer

In a completely redesigned rotational viscometer, all operating parts are placed within one housing. Table top of the housing contains controls and dials, within easy reach of operator, making apparatus easier to manipulate. Intended for broad utility, unit is designed to give complete data on flow properties of such materials as greases, plastics, adhesives, and food products. Over-all dimensions: 2 ft. 5 in. deep, 3 ft. 10 in. wide, 5 ft. 3 in. high.—*Precision Scientific Co., 3737 W. Cortland St., Chicago 47.*

—End

LIGHTNIN

The Mixer that MUST Live up to Expectations!



"LIGHTNIN" PORTABLE MIXERS

Electric motor driven, gear drive (shown) or direct drive—⅛ to 3 H.P. Also available with air motor, geared or direct drive types, from ⅛ to 1 H.P. Motors available for all characteristics. Smooth mixer lines permit easy sanitation. Ball and socket clamp provides famous LIGHTNIN double mixing action. Mixer can be rotated 360° horizontally and 90° vertically. Shafts and propellers are highest quality stainless steel. Standard propellers are accurately balanced for vibration-free operation. Easily adjustable on shaft or removable. For complete information, send for Catalog B-75.

You don't have to *guess* when you buy a LIGHTNIN Mixer. You KNOW it will do what you expect it to do. Every LIGHTNIN Mixer is *guaranteed* to do the job for which it is recommended—*or you get your money back.*

We can make you this guarantee because MIXCO engineers have developed data that enables them to predict accurately the mixing results you will get in every case. Furthermore, their recommendations are *impartial*—because MIXCO makes a *complete selection* of fluid mixers, covering every type of agitation requirement.

MIXCO "Process Adapted Agitation" has helped hundreds of plants to save time, cut processing costs and step up production. Let us help you with your mixing needs. Write, describing the problem. Your inquiry will receive a prompt reply.

SEND FOR big 28-page illustrated catalog and 4-page supplement on portable mixers and their applications. Much of its data on mixing is available from no other source. Ask for Catalog B-75.

PROCESS ADAPTED AGITATION
TOP-ENTERING
LIGHTNIN MIXCO
PORTABLES
SIDE-ENTERING

Complete Mixing Service for the Food Industries

FOR CLOSED TANKS—LIGHTNIN top entering propeller type agitators are available in electric motor driven construction from ¼ to 3 H.P., and in air motor driven type from ¼ to 1 H.P. Send for Catalog B-78.

FOR HEAVY DUTY MIXING—LIGHTNIN top entering agitators—turbine or paddle type. Fixed or variable output speeds available in heavy duty drive designed for ¼ to 100 H.P. Send for Catalog B-89.

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- ☐ Mixing Operations Data Sheet

Name ..... Title .....

Company .....

Address .....

City ..... Zone ..... State .....

1 **BLOWER** (center above) creates air movement for suction unloading of peanuts from trucks.

2 **CLOSE-UP** of suction end of swing pipe. Unloading is fast and labor is reduced to a minimum.

Shelling and Grading Peanuts

How Effective Materials Handling Minimizes Man-Hours

MOST effective handling of the bulk materials from raw to finished product, in order to get highest quality in the separation process, is the goal in the modern peanut shelling plant.

Such efficiency in the shelling operation is illustrated in the accompanying flow diagram (right), where the steps practiced by Stevens Industries, Inc., Dawson, Ga., are portrayed. This company's storage capacity is 2,400 tons and its processing capacity is 40 tons per hr.

Truck loads of peanuts as received from the farmers may be fairly clean or may contain as much as 50 percent dirt, stones, stems and trash. Unshelled nuts must be freed from as much foreign material as possible before shelling. This is accomplished immediately after the trucks are unloaded. A swing pipe from the suction side of a blower pulls the contents of the truck up to a preliminary separator. Here, some of the lighter material is removed and collected in cyclones for boiler fuel—see Point (2) in our diagram.

Another separation is made before the unshelled nuts reach the storage bins. A large portion of the dust, dirt and small diameter stones is removed as underflow from a vibrating screen, which then empties peanuts as overflow—see Point 3 in diagram—onto a distributing conveyor supplying the storage bins.

There is repeated air separation by blower to remove dust and light foreign materials from the unshelled nuts and for removing shells and shell fragments from the products. Vibrating screen separators also are employed repeatedly—both before the nuts are shelled and after shelling—for ridding the lots of unwanted materials and for grading purposes.

Peanuts are shelled on five floors of the Stevens plant. Horizontal travel of products is by screw- and belt-conveyors. Up travel is by vertical bucket elevator, down by chute. There is continuous movement of products from bulk storage bins to storage of shelled, graded nuts.

Labor requirements are low, being limited to inspectors on the lines and attendants at the vibrating screens in the unshelled-nut cleaning department—Points (7) and (8). The workers must remove the excess of stems and trash by hand to prevent clogging of the machines.

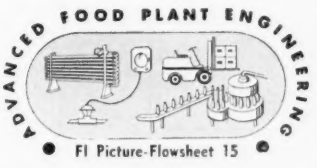
Shelled nuts are separated into two grades—whole sound nuts and "splits and shrivels". A single stoner is used for final cleaning of the latter. Tandem stoners and a vibrating screen—Point (10)—are required for cleaning of No. 1 nuts.

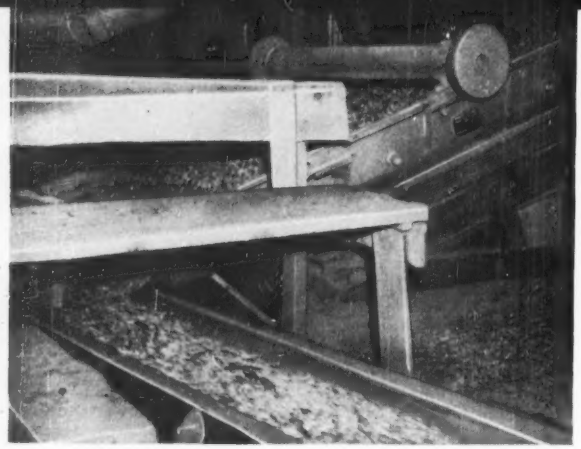
All conveyor belts transporting shelled nuts are equipped with magnetic separators to take out any tramp iron.

After passing along sorting and inspection conveyors and getting their final vibrating-screen cleaning, No. 1 nuts are weighed into bags—by automatic batch scales to prevent human errors. Then the bags are closed by automatic sewing machines.

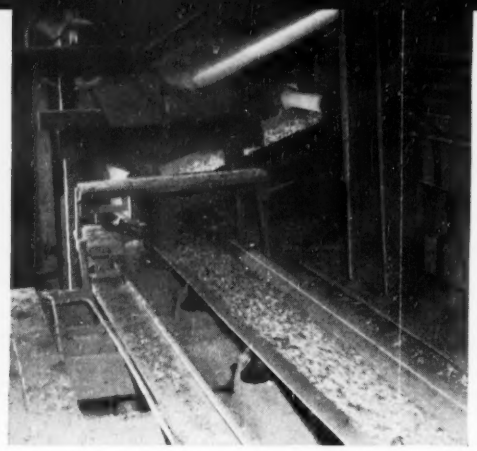
In company-owned facilities, products of the Stevens shelling plant are processed into peanut oil, salted nuts, and peanut butter. The products are also sold for the use of other food processors—bakers, confectioners, and those who manufacture salted nuts and peanut butter.

FOOD INDUSTRIES Mar. 1950 Pages 100-103

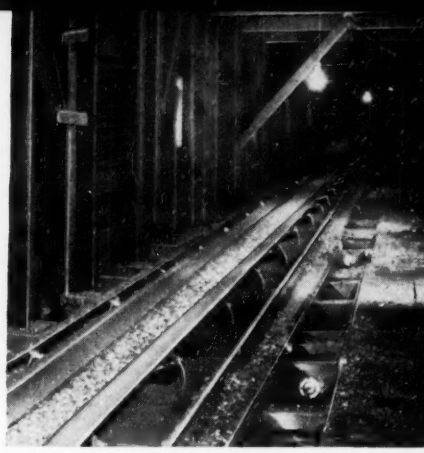




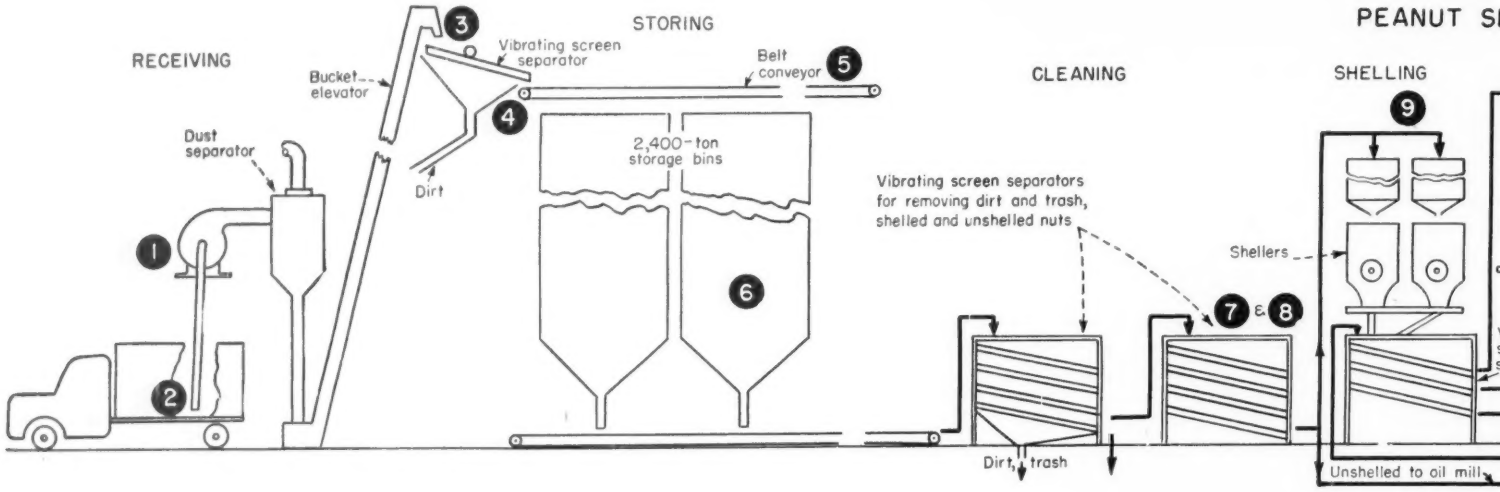
3 **VIBRATING SCREEN** separator removes dirt and small stones. Nuts are raised, via bucket elevator, to screen located at top of mill.



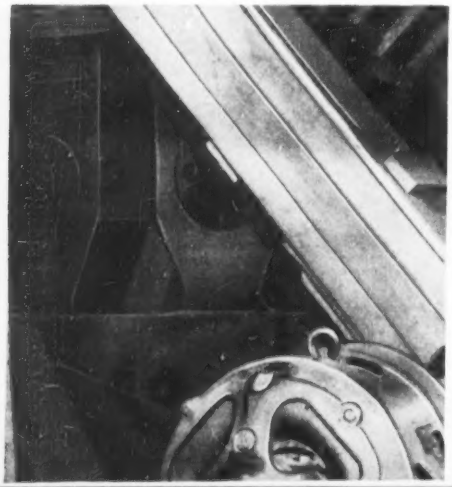
4 **FROM** vibrating screen (center rear) peanuts are discharged onto conveyor belt and . . .



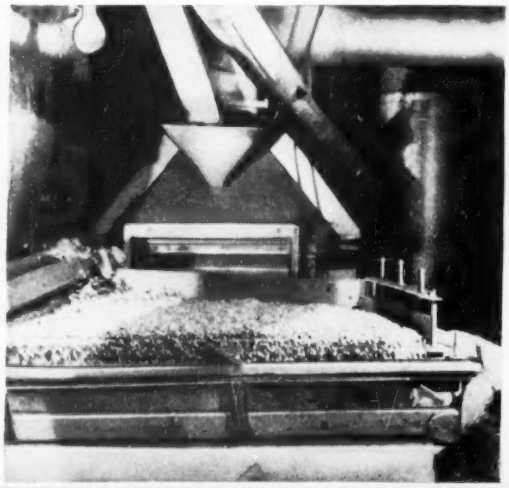
5 . . . **WHILE** proceeding in headhouse, are dumpe intervals into storage bins below.



9 **PEANUT SHELLING** machines are installed in a compact battery (seen here in rear).

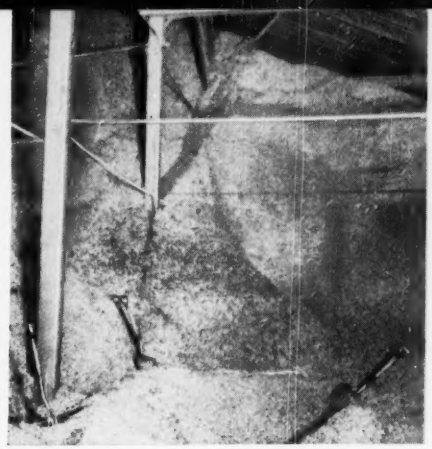


10 **STONERS** in tandem (rear) and a vibrating screen (foreground) are used in cleaning No. 1 nuts.

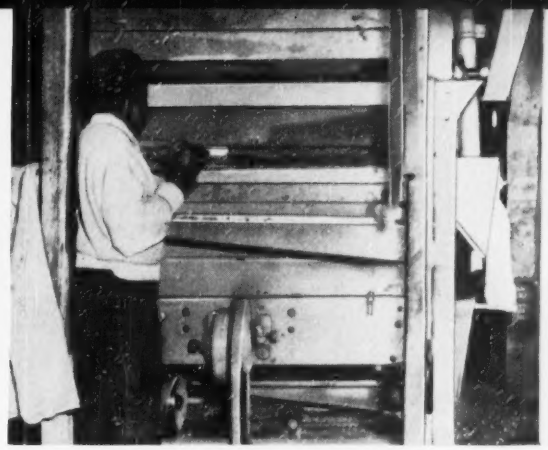


11 **SINGLE** stoner (rear) is used on "splits and shrivels" line. Discharge is onto inspection belt (foreground).

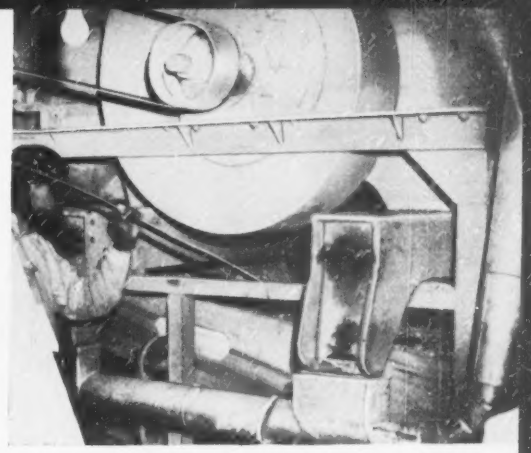
dumped at



6 **SEEN HERE** is bulk storage of unshelled nuts. Bin capacity of plant is 2,400 tons.

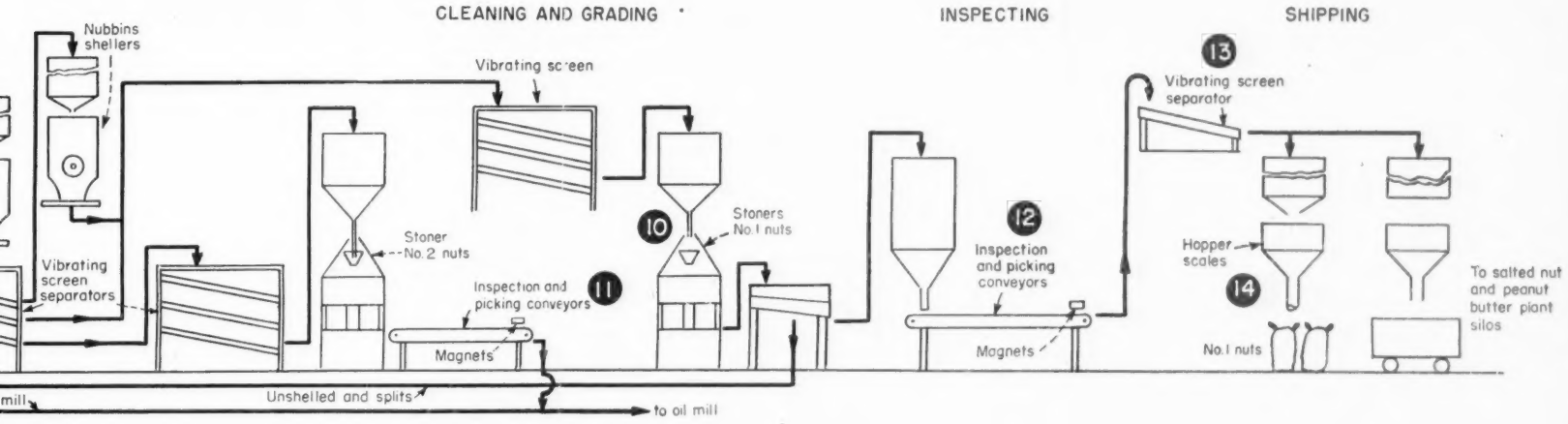


7 **IN UNSHELLED** nut department, vibrating screens must be manually checked to prevent clogging from stems and trash.



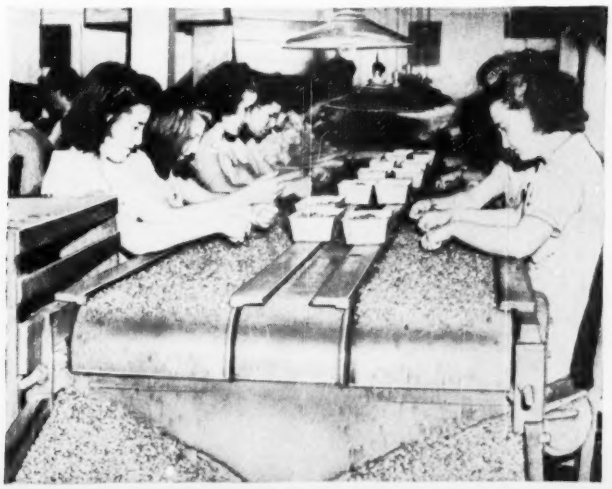
8 **AIR SEPARATOR** (top) is combined with mechanical-action screen (below) for thorough cleaning.

T SHELLING AND GRADING

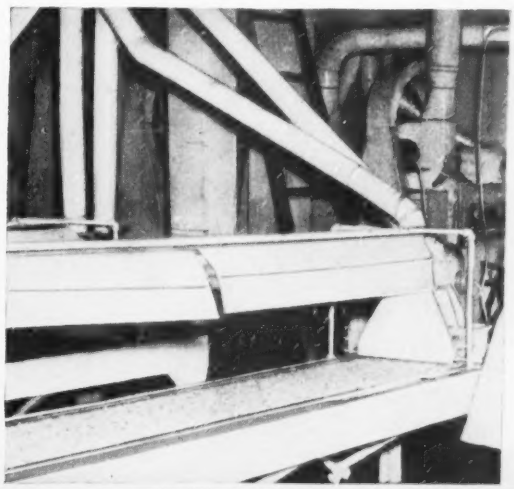


rels"
1).

12 **WOMEN** along inspection and picking-belt conveyors cull out blemished nuts. Magnetic separators remove tramp iron.



13 **AT END** of conveyor, suction vent (right) and magnets give nuts final cleaning.



14 **BAGS OF NUTS,** after automatic weighings are sewn with a machine stitcher.

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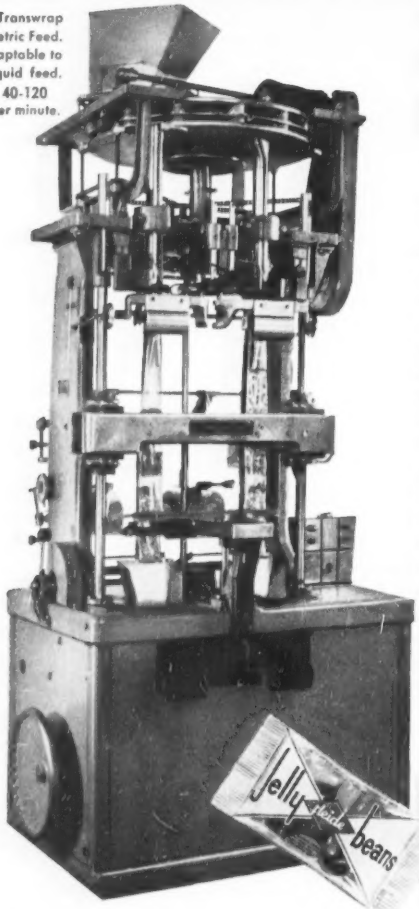
TRANSWRAP

AUTOMATICALLY COMBINES MINIMUM PACKAGE COST WITH MAXIMUM VERSATILITY

Model "B" Transwrap with Volumetric Feed. Also adaptable to auger or liquid feed. Produces 40-120 pkgs. per minute.



In one machine, TRANSWRAP is a self-contained "packaging department." Using cellophane, Pliofilm, glassine, roll foil or other suitable heat-sealing materials, it forms, fills and seals your package completely automatically.

The same TRANSWRAP machine with suitable feed assembly can package 1 aspirin tablet or 1 lb. of peanuts . . . 1 teaspoon of vanilla extract or 1 lb. of margarine . . . 5 grams of salt or 16 oz. of powdered milk. Package sizes possible range from ⅞" x 2" to 5¼" x 13". They may be either pillow, or "fin seal" type (sealed around four edges).

From the standpoint of economy, TRANSWRAP adjustments and operation are so simple, a single operator can handle a whole battery of machines. Attractive, sales-conditioned TRANSWRAP packages, *filled and sealed*, actually *cost less* than ready-made *empty* bags.

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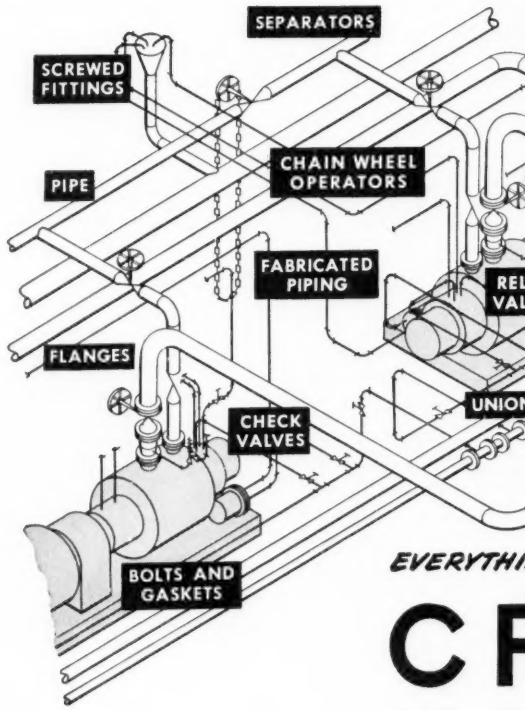

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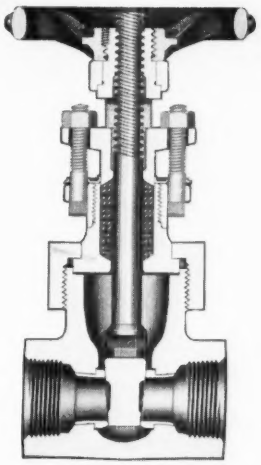

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For steam up to 850 deg. F., and for water, gas, or air.
Sizes: ¼ to 2 in.
Screwed or welding ends

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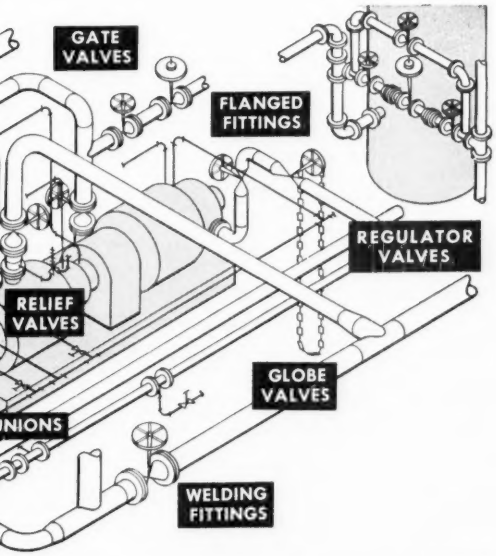

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FLEXIBLE HOSE

made from

. . . CARPENTER STAINLESS No. 20

This length of 1½" I.D. (.025" wall) flexible hose is the first of its kind, made from Carpenter's super corrosion-resistant Stainless No. 20.

This new hose will be particularly useful in applications where full corrosion resistance must be combined with flexibility . . . such as on equipment which vibrates, and where connections are used between movable parts or machines. Fluid line connections, and mechanical parts which must flex, are additional uses being developed.

Present size range of Carpenter Stainless No. 20 Flexible Hose is from 1" to 2⅝" I.D. Standard pipe size nipples can be welded to the ends, as shown here.

For technical data and recommendations on use of this new flexible hose, write to Carpenter's Engineering Department outlining your problem. A bulletin describing the corrosion-resisting properties of the material will be sent upon request. Just write a note on your company letterhead and ask for the Carpenter Stainless No. 20 Bulletin.

THE CARPENTER STEEL COMPANY • Alloy Tube Division
109 Springfield Road • Union, New Jersey

Export Department: 233 Broadway, New York 7, N.Y. "CARSTEELCO"

Carpenter

STAINLESS TUBING

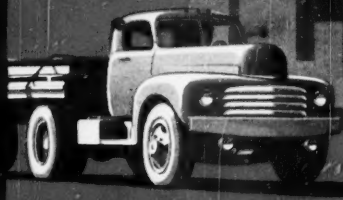
"MORE THAN CORROSION RESISTANCE"

EATON

2-Speed Truck

AXLES cut down Stress and Wear on Vital Truck Parts

Eaton 2-Speed Axles *double* the conventional number of gear ratios, enabling drivers to use the *right* gear ratio for every operating condition—starting out under full load, climbing grades, highballing, quick shifting in traffic. As a result, vital truck parts are not overstressed, engines are permitted to run at most efficient speeds, minimizing engine wear. Furthermore, Eaton Axles last longer, because planetary gearing better distributes gear-tooth loads, reducing stress and wear on the axle itself. Ask your truck dealer to explain how Eaton 2-Speed Axles more than pay for themselves.



Axle Division

EATON MANUFACTURING COMPANY

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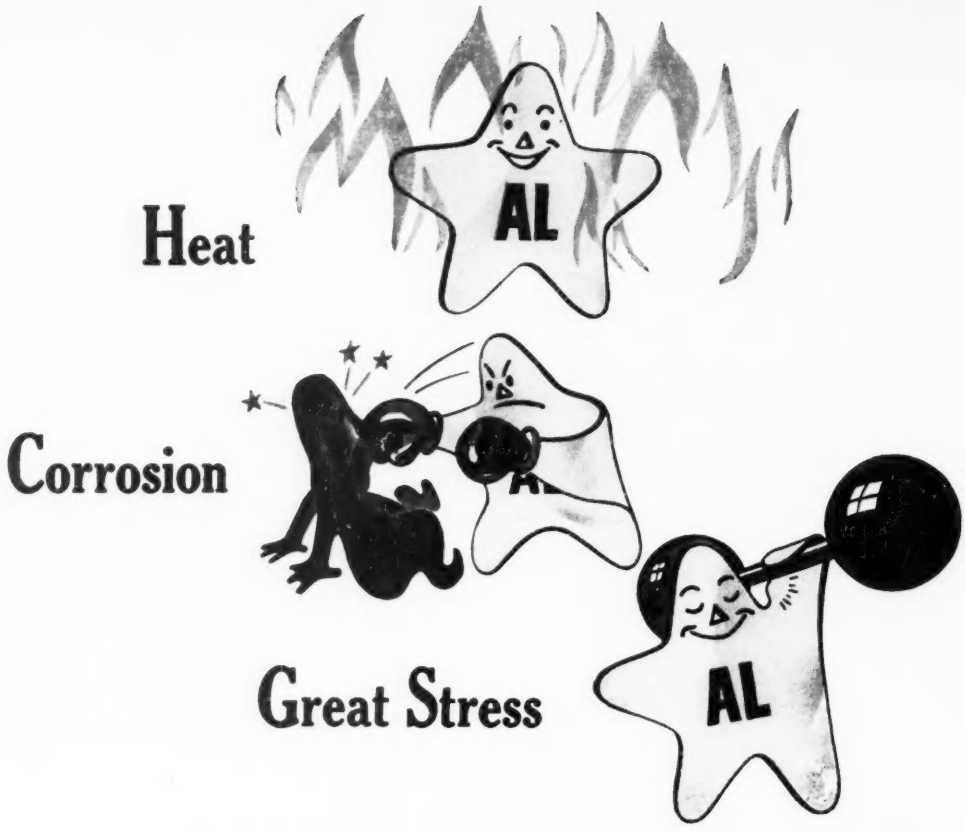

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Here's your data on
STAINLESS PLATES
(Solid and Clad)

Valuable new 32-page book on "Allegheny Ludlum Stainless Plates and Their Fabrication" now available to fabricators and users. Makes available for the first time all the data you need on sizes, types, fabrication and use of Stainless Plates, solid and clad.

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A lifetime servant that can stand up to your job—practically under *any* conditions of heat, corrosion and wear—that's what you get when you specify Allegheny Metal. Great strength and resistance to chemical or atmospheric corrosion . . . rugged ability to take a beating . . . bright, shining beauty and endless ease of cleaning . . . they're all yours with this time-tested stainless steel.

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GOLDEN BROWN
Naturally
Free-flowing!

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CORN-OIL LECITHIN

(BONE-DRY)

IN THEIR OWN PRODUCTS—in continuous use of VODOL-XX over long periods—representative food industries have proved its unequalled advantages to their complete satisfaction. Pure virgin corn oil provides nature's finest lecithin! Processing by Refining Unincorporated has brought its incomparable qualities to perfection.

THE BONE-DRY CHARACTERISTIC OF VODOL-XX positively prevents any moisture disturbance. (Important to the chocolate manufacturer.)

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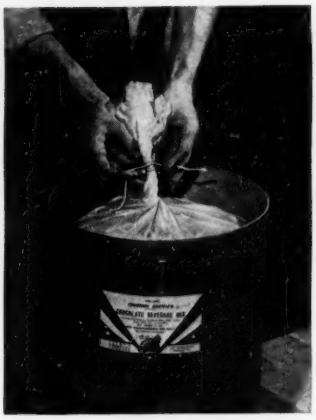
New Packages and Products

Food goes in lined drum

Then film is pulled up



And tie-up seals it

Flexible Plastic Liner Cuts Shipping Costs

For bulk packaging a wide variety of solid, liquid, or semi-liquid products, plastic film liners, snugly inserted into fiber drums and cartons, are finding ready use by cost-minded shippers.

The experience of an important distributor of frozen strawberries is illustrative. This firm reported that by adopting a lightweight fiber drum lined with the film it was able to reduce the tare weight per shipment by about 66 percent. Shippers of items such as powdered milk, beverage powders (see photos), and meat products, have scored similar success with the new combination package. The tare weight reductions, of course, bring considerable overall savings in shipping costs.

Made of Visqueen polyethylene, produced by the Visking Corp., Terre Haute, Ind., the film is tasteless, odorless and non-toxic. The material is also chemically inert, is not affected by acids or alkalis, and is not sticky, hence will not adhere to foods being shipped.

Frozen food processors have found that the film's flexibility at low temperatures makes it ideal for their use. It is reported that almost any product now shipped in slack or tight barrels, kegs, or other containers, can use this new method of packaging.

Being essentially "one-way" carriers, the new film-lined drums and cartons do away with the problem of returning and reconditioning used containers.

Large Size Easter Carton

One dozen chocolate marshmallow eggs are packed in a striking, 17-in.-long pink and white container to comprise the "Giant Size Easter Egg Carton" of Overland Candy Co., Division of Leaf Brands, Inc., Chicago.

Each egg is decorated with colorful molded butter creams in assorted figures and shapes. And each piece is clearly displayed through an oval cellophane window. In addition, the confections are fully protected by separate partitions. Packed two dozen boxes to the case, shipping weight is 14 lb. total.

Glass Replaces 25-Yr. Carton

The fiber container which has been the traditional package for Domino sugar and cinnamon since 1925 has gone by the boards. Now, a special shaker-top glass container has been adopted to add new sales appeal to this blended product.

Designed by Dwight Fuerst, of Owens-Illinois Glass Co., the jar has blown decorations which are simulated enlargements of sugar crystals.

Bottom of the package is recessed to permit easy stacking. The customary Domino colors of blue and red, printed on a canary yellow background, are combined in a wrap-around label. Shaker top is yellow with the tradename printed in blue.

The glass shaker holds 5 oz. of the mixture. It has a popular household re-use feature as a salt or pepper shaker to add to its utility.

TRAILERS HANDLE 50% MORE...
Yet Cut Hauling Costs More Than 33⅓%!

"Chief reasons for the change to Trailers," says John N. Lee, Executive Vice President of Lee & Cady, "are the economies we effect, plus the fact that Trailers give us greater flexibility in our operations."

THE Lee & Cady operation is typical of the tremendous savings effected by using Trailers in shuttle, over straight trucks. It is typical, too, of the well known money-saving advantages of owning Fruehauf Trailers. Fruehaufs are money-making partners that out-perform, out-last and out-sell any other Trailer on the road today!

The Fruehauf line is complete. From the "Shorties" shown here for intra-city deliveries, to the huge, rugged, over-the-road cargo carriers of Stainless Steel, Fruehauf is first . . . first in dependability . . . first in cargo-carrying capacity, and first in cost-cutting efficiency!

If you are not now using Trailers, write us (on your business letterhead) for a "Transportation Cost Analysis." See how Trailers can materially cut your hauling costs. The service is yours without obligation. Write to the Fruehauf Trailer Company. Detroit 32, Los Angeles 11. In Canada: Weston, Ontario.

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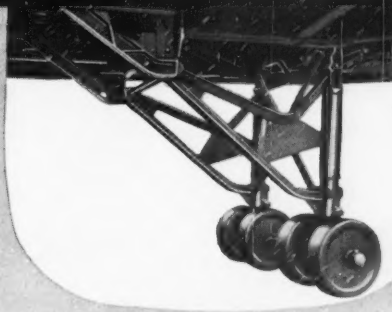
equipped with *Automatic Supports*
SPEED UP SHUTTLE OPERATION

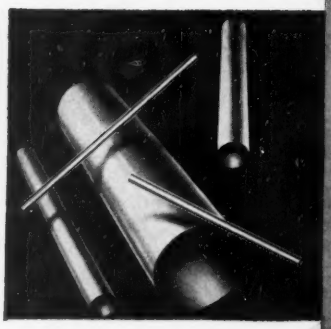


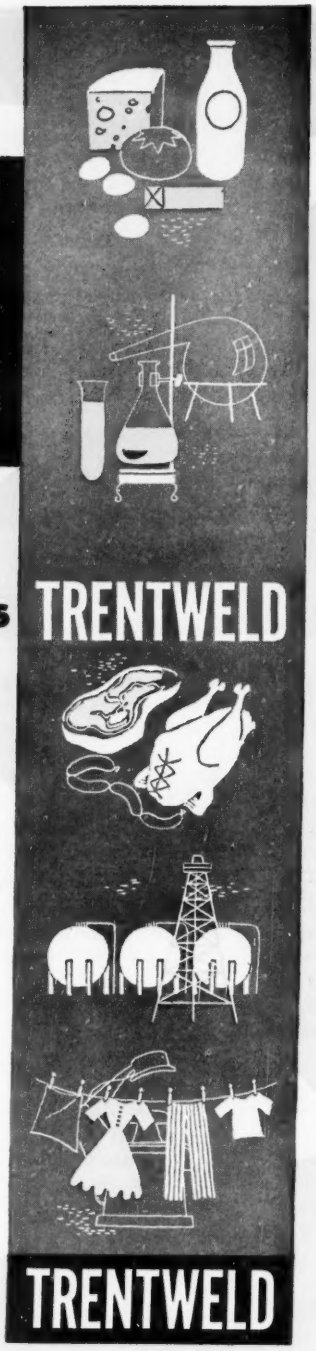
SUPPORTS come down, ride up safely, surely, automatically, with Fruehauf Automatic Supports.

Coupling and uncoupling time is *cut in half* because mechanical operation is largely automatic. Moreover, an Automatic equipped Trailer just can't "nose-dive" —the Supports are *always* in correct position.

FRUEHAUF Trailers

FIRST IN TRUCK-TRAILER TRANSPORT





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In processing plants throughout industry where cleanliness, corrosion, heat or abrasion are production problems, more and more engineers and designers are looking to TRENTWELD Stainless Steel Tubing for the answer.

That's because TRENTWELD is made in a *tube* mill by *tube* experts . . . who roll and weld stainless and high alloy tubing *without* added rod metal. Developed by Trent specialists, this method results in tubing that is metallurgically correct and has a uniform section . . . with no zone of weakness for corrosion to attack.

The complete TRENTWELD line . . . $\frac{1}{8}$" to 22" diameter in long lengths and up to 30" diameter in shorter lengths . . . offers a wide range in a variety of grades, gauges and finishes for almost every industrial application.

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STAINLESS STEEL TUBING

Foil Protects Crispness

Lettuce packed in crates lined with aluminum foil recently made a very successful trip from California to New York. In fact, the vegetable was reported to have arrived at the destination so much fresher and crisper that it brought top market prices.

Shipper was K. R. Nutting Co., Salinas, Calif. Reynolds Metals Co., of New York City, supplied the foil.

When packed on the West Coast, the crates were foil-lined in this fashion: A sheet was placed between the second and third layers of lettuce, and then another sheet went in to cover the top of the third layer. Snow ice was placed on this top piece. And finally, the ends of the lining were folded over the ice and the top of the crate fastened on.

For this shipment, the aluminum foil proved such an excellent insulating material that the crates contained most of the original ice after the long trip. Crates were firm and dry. And butt ends of the lettuce were white—a sign of freshness that buyers look for.

Easily-Divided Beer Case

The recently introduced Twin Pack case of Olympia Brewing Co., Olympia Wash., has been designed so that the retailer, with a couple of easy knife-slits, can divide it in half to make two complete 12-bottle cases.

Thus, this brewery reports it has obtained the benefits inherent in small cases while eliminating their disadvantages to the retailer. It has been found that the ordinary half-pack had resulted in fewer sales of the two-dozen bottle containers.

In short, this new package is planned to sustain full-case buying and, at the same time, provide the retailer with a half-case (when necessary) to step up his small-quantity sales.

Clear-Wrapped Oleo

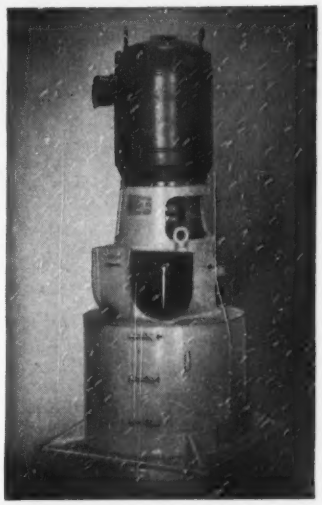
To provide extra merchandising aid to food retailers, Swift & Co. now distributes yellow Allsweet margarine in a new cellophane pack.

Four individually wrapped quarter-pound prints are contained in each package. Product is available in all 32 states that permit the sale of the yellow spread—except California.

The package's special heat-sealed seams are designed to assure complete sanitary protection and guard the flavor of product. The maker reports

PUREEING
PULPING
JUICING
SHREDDING
BLENDING

For Food and Food By-Products



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DISINTEGRATORS

Cut Costs

Differential discharge feature saves power and improves product; stainless steel contact surfaces quickly serviced and cleaned; vibrationless vertical design requires minimum foundation and floor space.

10 STANDARD MODELS
5 TO 300 HP

Meet rigid sanitation requirements.

Experienced application Engineering Service available.

Rietz MANUFACTURING CO.
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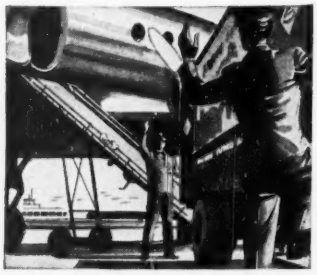
Write for *FREE* illustrated Bulletin #520

Press breaks down — but $2.88 keeps editions rolling

Press broke down at 5 P.M., at end of evening edition's run. But this publisher got replacement parts in a hurry the same way he gets electros, mats, news photos —by Air Express. An 18-lb. carton traveled 500 miles, was delivered by 11 P.M. Shipping charge $2.88. Morning edition published as usual.

Air Express is the best air shipping buy to keep any business rolling, since low rates include door-to-door service. Answers your problems because Air Express is *fastest* and *most convenient.*



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that consumers like the new container because it provides instant brand identification and displays the colored product so well.

Baby Orange Juice

Canned whole orange juice, packed especially for babies, is now being introduced by the Bib Corp., Lakeland, Fla.

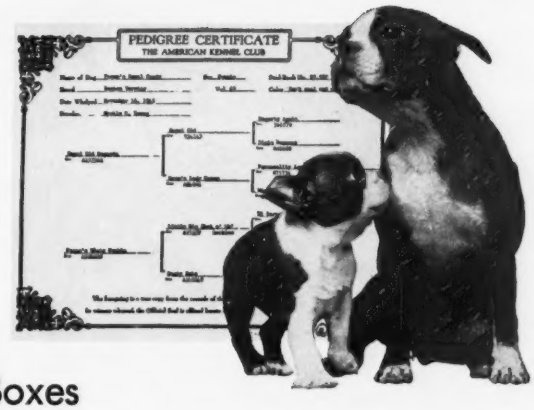
Called the first infant citrus food of this kind, the juice is scientifically prepared, strained and packed in 4-oz. cans for individual feedings. Product flavor is controlled, and the Vitamin C content is guaranteed.

Tradenamed Bib, the food has been extensively testmarketed, and the maker reports excellent reception. Product has received the seal of acceptance of the Council on Foods & Nutrition of the American Medical Association.

Jelly Making Gets Easier

From concentrated pure fruit juices comes the new grape and apple jelly base produced by Fischer-Spiegel, Geneva, Ohio.

Contents of an 8-oz. jar make 5 lb. of jelly. Directions are as follows: 1) Pour the contents of the jar into a pan, 2) add enough water to fill the empty jar full four times, 3) heat the



The Boston Terrier was bred in Boston about sixty years ago from English Bulldog and white English Terrier stock. This little fellow is exceptionally lively and bright, and truly deserves the title of "American Gentleman."

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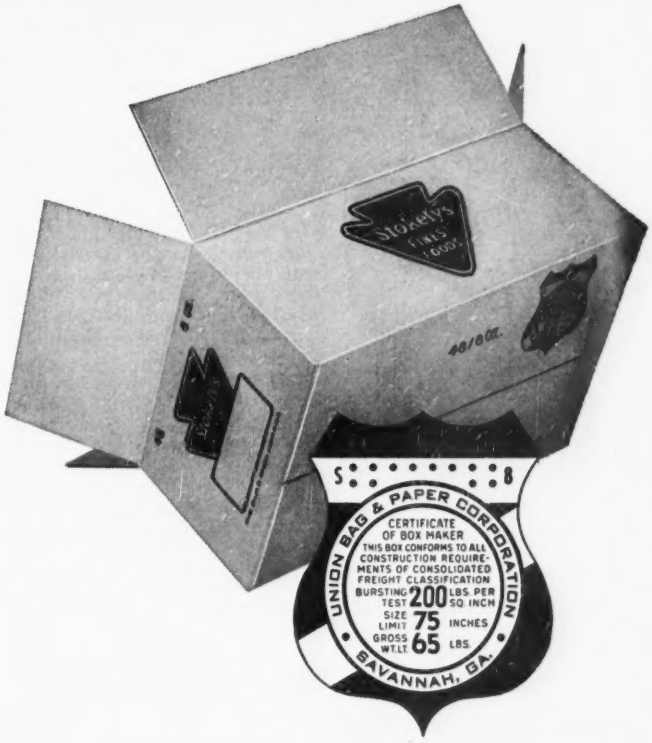
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mixture to a simmer, 4) add six cups of sugar and stir until dissolved.

The jelly is removed from stove as soon as it boils. Foam is then skimmed off and the clear liquid poured into glasses. Melted paraffin, of 1/8-in. thickness, is recommended to be poured immediately on the top.

The base is made by concentrating the juices in vacuum evaporators, recovering the essence carried away by evaporation in fractionating columns, and returning the essence to the finished concentrate.

Quickly Tenderizes Meat

A new enzymatic meat tenderizer, reported to age meat much faster and better than lights or coolers, was recently introduced by Petajan Co., Milwaukee.

Tradenamed M-ten, the new item is an odorless, practically tasteless food powder composed of wheat flour, salt, dextrose and vegetable enzymes similar to the enzymes used for tenderizing sausage casings.

Product can be purchased in handy 4-oz. shakers or in bulk drums. It is applied simply by dusting lightly on meat and working into the tissues with points of a fork, or other device. It is reported that some processors have developed special machines with numerous tines to speed up this operation.

Extensively tested for over a year by locker plant operators, chefs, and housewives, the powder is said to tenderize any grade or cut of fresh meat in a few minutes without changing the original flavor.

According to the manufacturer, the enzymes in the powder create a mild "pre-digesting" action which breaks down tough connective tissues, thus allowing meat to heat through faster.

—*End*

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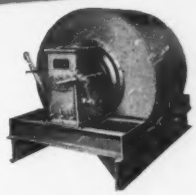

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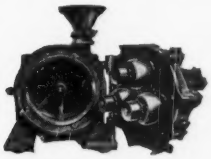

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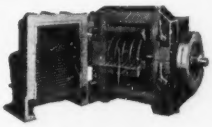

SWING-SLEDGE MILLS

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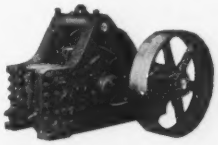

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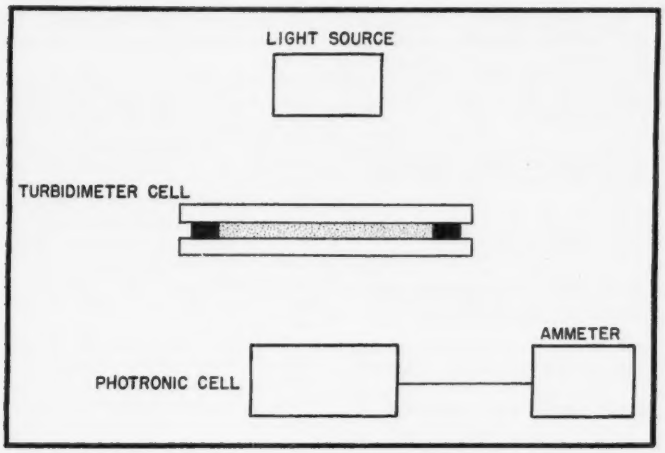

Quick Analysis for Bone Char Residue

A simple, rapid procedure for determining the carbonaceous residue (Carb) in bone char has been developed by the National Bureau of Standards. The method employs an easily constructed turbidimeter cell (see illustration above) which consists of two glass plates 8 in. sq. separated by a 1/16-in. brass plate containing a 5-in. hole. The assembly is made water-tight by sealing.

Various concentrations of the sample of bone char in suspension are obtained by successive dilutions, then placed in this turbidimeter cell between a light source and a photronic cell connected to a microammeter. For each concentration, the transmittance—that is, the ratio of the intensity of the light transmitted through the suspension to the intensity transmitted through distilled water—is obtained from the reading on the microammeter. Percent Carb is then readily determined from these data by a simple graphical procedure.

In preparing the bone char suspension, the sample is ground in an automatic mortar and pestle, until about one-half of it passes through a No. 270 sieve. Then 10 ml. HCl solution (1 to 5) is slowly added to 0.2g. of sieved sample in a beaker. The resulting mixture is brought to a boil and diluted to 100 ml.

Before taking readings, the light source and photronic cell are adjusted so that transmission is 100 percent with distilled water in the turbidimeter cell and so that the microammeter reads 0 when all light is blocked off. Transmittance T_1 of sample of prepared concentration C_1 is then obtained. The cell is next emptied, washed and wiped dry. A portion of the original suspension is diluted to twice its volume with distilled water, and transmittance T_2 is obtained for concentration C_2. This procedure is repeated for several more dilutions until transmittance is about zero.

In plotting the calibration curve, percent Carb is determined for a number of samples by measuring the loss of weight upon ignition of the acid-washed residue. Once the calibration curve is constructed, it can be used to determine the percent Carb of any particular char sample.

Digest from "Rapid Determination of the Carbonaceous Residue in Bone Char," Technical Report 1405, National Bureau of Standards, Washington 25, D.C.

DAIRY

Browning of Dried Milk

Fresh whole milk powder, made by the spray-drying process, has about 2.93 mg. amino nitrogen per g. when determined by the Van Slyke method, and about 3.64 mg. when determined by the formol titration method. The difference is attributed to titration of non-amino groups by the latter method.

On heating milk powder at 212 F. for two days, amino acid (determined by Van Slyke method) dropped to 1.73 mg. per g. while there was scarcely any change in the formol titration figures. The number of titratable acid groups actually increases during the heating period, and many of these are titrated during the formol titration. Thus, if each amino group lost by the browning reaction were replaced by a new titratable group, formol nitrogen determination would show no loss of amino nitrogen.

When a large excess of lactose is heated with a mixture of amino acids, there is an intense browning reaction with a loss of amino acid nitrogen. If the sugar and amino acids are present in equal amounts, browning takes place without loss of amino nitrogen. Variations in concentration of constituents may therefore be one reason for discrepancies in loss of amino nitrogen that have been reported during browning of many different foods.

Digest from "The Browning Reaction in Dried Milk Powder" by J. B. Koster and R. A. Chapman, *Canadian Journal of Research*, Vol. 27F, 429-34, Nov. 1949.

Ascorbic Acid in Goat's Milk

Reduced ascorbic acid exists in goat's milk in an amount and condition similar to that in cow's milk.

Samples of milk from 18 representative goat dairies in central Massachusetts were compared in the laboratory with cow's milk for reduced

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ascorbic acid, checks being made at the time of arrival (approximately 18 hr. after milking) and subsequently at four 24-hr. intervals. During the study, samples were stored in darkness at 50 F. in the original bottles.

Goat's milk lost 31.5, 8.3, 8.9, and 12.5 percent reduced ascorbic acid, respectively, per day, or a total of 61.2 percent during the four days. Cow's milk, stored under similar conditions lost 65.5 percent.

Digest from "Decrease of Reduced Ascorbic Acid in Goat's Milk During Storage," by A. D. Holmes, *Food Research*, 468-71, Nov.-Dec. 1949.

FATS AND OILS

Hydrogenated Vegetable Oil Resembles Cacao Butter

A new synthetic fat that has a maximum of solids at room temperature, and a minimum of solids and a relatively sharp melting point at body temperature, is prepared by a patented process. Crux of the process is hydrogenation of normally liquid vegetable oils using a sulphonated catalyst. Directions are given for preparation of a nickel catalyst containing 3.65 percent sulphur.

Properties of oils hydrogenated with this catalyst are comparable to those of cacao butter. The process is said to be operative with peanut, cottonseed, soybean and other normally liquid glyceride oils.

Digest from U. S. Patent 2,468,799, issued May 3, 1949, on an application dated Oct. 20, 1943, to N. W. Ziels, Leonia, and W. H. Schmidt, Grantwood, N. J., and assigned to Lever Brothers Co., Cambridge, Mass.

FRUITS AND VEGETABLES

Enzymes Influence Quality of Food

Although the activity of enzymes is usually detrimental in the processing of fruits and vegetables, it proves beneficial in other instances. Diastase converts starch into sugar; pectin-splitting enzymes clarify apple juice; and proteolytic enzymes tenderize meat.

Enzymes are present in all living cells to catalyze chemical reactions. They greatly accelerate the process of ripening when fruits or vegetables are separated from the tree, shrub, or vine. And they are also responsible for accelerated metabolism when damage is done by rough handling. This results in deterioration of quality.

Spinach, sweet corn, asparagus, peas, and lima beans rapidly lose flavor and quality at temperatures above 60 F. Enzymes also cause undesirable changes in color, texture, flavor, and odor in frozen fruits and vegetables before and during freezing and storage, but particularly after thawing. There is also evidence that enzymes hydrolyze the pectin in berries, thus reducing their gelling properties. If not inactivated, enzymes rapidly destroy ascorbic acid in apple and tomato juices.

There is an optimum, minimum, and maximum pH value and temperature for the activity of each enzyme; they may be completely inactivated at high temperatures and greatly modified at low temperatures. They are also affected by various forms of radiation, ultrasonic and ultraviolet having destructive effects. Sulphurous acid in varying concentrations will either retard or even stop the browning of fruits by oxidases, but will not prevent hydrolysis of pectin.

Heat treatment is the most practical and effective method of controlling enzymes in many food products. It must be at a temperature high enough to stop their activity, but not so high as to damage the product. The temperature of greatest activity for many fruit and vegetable enzymes lies between 122 and 176 F., and their destruction is accomplished only at temperatures of 180 to 190 F. At 0 deg. F. enzyme activity is much retarded, but the temperature must be reduced to −40 F. before the activity becomes insignificant. Heat treatment must be applied as soon as possible after fruits and vegetables are picked because they are constantly undergoing changes.

Digest from "Product Quality as Influenced by Enzymes," by C. C. Strachan, *Australian Food Manufacturer*, Vol. 19, 32–34–36, Sept. 5, 1949.

Aeration Before Dehydrating Betters Mashed Potatoes

Improved quality of dehydrated mashed potatoes is the goal of a newly patented process, principal feature of which is whipping of the cooked potatoes to form an aerated mash that is subsequently extruded into filaments and dried. The inventors have found that lack of homogeneity is the principal cause of uneven drying and non-uniform consistency in the reconstituted product. This is said to be overcome by the whipping. Care must be exercised in cooking and whipping to avoid disruption of the potato cells.

Extruded filaments may vary in diameter from 1/10 to ¼ in. They are deposited on a supporting screen in the form of an interlacing open mass, and are dried in air at 180–280 F. moving at a velocity of 150–300 linear fpm. Optimum moisture range of the product is 3–5 percent. Thus dried, the filaments are tubular in shape with highly porous walls. They

can be rehydrated almost instantaneously, and beaten until light and fluffy.

Digest from U.S. Patent 2,481,122, issued Sept. 6, 1949, on an application dated Nov. 15, 1945, to C. W. Kaufman, Tenafly; H. M. Burgess, Dumont; and F. Hollis, Jr., Weehawken, N. J., assigned to General Foods Corp., New York City.

VITAMINS

Thiamin Is Stable In Peanut Butter

Enrichment of peanut butter with thiamin is practical, since under moderate storage conditions retention of the vitamin is excellent.

Raw peanuts are a good source of thiamin, but when they are roasted the vitamin is quickly destroyed. And peanut butter made from the roasted nuts contains only 0.4-1.3 μg. per g. To test the stability of thiamin in enriched peanut butter, capped jars from the same batch were obtained on the day of production. One sample was assayed immediately, and several other jars were stored at each of the following temperatures: −20; +40; 65; 80; 99 and 130 F. At intervals of 1, 2, 3 and 5 months, one jar was withdrawn from storage at each temperature and assayed in duplicate for thiamin.

By plotting percent retention against time, curves were obtained indicating that loss of thiamin occurs according to a first-order reaction. Losses at −20 and +40 F. were negligible. At 65, 80, 99 and 130 F., losses per month were 2, 7, 11 and 28 percent, respectively, of actual thiamin content. The data indicate that enrichment to the level of thiamin in raw peanuts makes peanut butter a good dietary source.

Digest from "Determination of Effect of Heat On Peanuts and the Stability of Thiamine In Enriched Peanut Butter," by S. A. Fournier, J. F. Beuk, F. W. Chornock, L. C. Brown and E. E. Rice, *Food Research*, 413-16, Sept.-Oct. 1949.

BAKING

Variations in the Ingredients Affect Ration-Biscuit Life

Keeping quality of biscuits containing supplementary materials is good when a stable vegetable shortening is used.

Starting with a basic formula for ration biscuits, the effect of increasing the level of several of the constituents (or of omitting them altogether) on the keeping quality was determined. Flavor scores, peroxide value, pH of a potassium chloride extract, and fluorescence of the extract were used as criteria. The basic formula called for 50 lb. flour, 5 lb. shortening, 6 oz. baking

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soda, and water. Finished biscuits were stored at 110 F. up to 88 weeks.

Flavor scores and peroxide values varied irregularly with storage time; pH and fluorescence measurements were more consistent. Sugar improved flavor scores, while skim milk and salt additions reduced them. Peroxide values of extracted fats were raised by increasing the salt in the formula and decreased by adding defatted soybean flour. The latter ingredient increased the fluorescence of potassium chloride extracts, however. Fluorescence was also increased by baking soda, skim milk powder, malt, and salt, but was decreased by sugar. The pH of potassium chloride extract was increased by defatted soybean flour and soda; decreased by skim milk powder and malt.

Quality of shortening had a considerable influence on the action of individual constituents and in some cases even reversed their effects.

Digest from "Ration Biscuits. V. Effects of Kind and Concentration of Various Constituents on Keeping Quality", by H. J. Lips, J. B. Marshall, W. H. White and G. A. Grant, *Canadian Journal of Research*, Vol. 27F, 419-25, No. 1949.

CONFECTIONERY

Special Chocolate Coating Withstands Hot Weather

According to a recent patent, it is possible to make a chocolate product, particularly adapted for use as a coating on edible centers, which will not flow from the centers nor adhere to the wrapper under conditions of summer and tropical heat. Typical of such products is a mixture of chocolate liquor, cocoa butter, sugar and, frequently, milk powder.

The crux of the process is to mix the ingredients in such a manner as to leave a certain proportion of the surfaces of the sugar and milk particles bare of any film of fat. When such a mixture sets it resists deformation at high temperatures due to the bonding of these moist sugar and milk particles.

When such a composition is to be used for enrobing, however, the mixing step must include addition of a small amount of water. This has two effects: It gives temporary fluidity that facilitates handling, and by wetting the non-fat particles it creates unstable fat films that subsequently break down and permit a "set" that resists flow. A complementary phase of the invention is the moistening and subsequent drying of the surface of enrobed pieces, resulting in formation of a crystallized sugar skin on the coating, which effectively prevents undesirable flow or adhesion to the wrapper. This process is conveniently carried out in a continuous tunnel, where the enrobed pieces are first passed through a humid atmosphere and later cooled.

Digest from U. S. Patent 2,480,935, issued Sept. 6, 1949, on an application dated Aug. 9, 1945, to N. W. Kempf, Auburndale, Mass., and H. H. Hoben, River Forest, Ill., assigned 50 percent to General Foods Corp., New York City.

New Manufacturing Process Yields Better Pudding Mix

Improvement in flavor and hygroscopic quality of caramel pudding mix is reported achieved by a recently patented process. As currently manufactured, sugar is caramelized, solidified by pouring onto a slab, and ground in the presence of starch. The flavor is not uniform, and the product tends to cake when packed and stored under commercial conditions.

In the new process, sugar is caramelized in the usual manner and cold water is added with rapid stirring to produce a syrup having a specific gravity of 32-35 deg. Bé. at 60 F. This is filtered and mixed with starch in a horizontal ribbon blender, then transferred to trays and dried at 160-180 F. to approximately 10 percent moisture. In this form, the mix is easily ground to pass a 100-mesh screen. It is found to be uniformly flavored and not subject to caking.

Digest from U. S. Patent 2,484,543, issued Oct. 11, 1949, on an application dated July 26, 1948, to A. R. Baldwin, Berwyn, and William Hatch, Oak Park, Ill., assigned to Corn Products Refining Co., New York City.

MEATS

Precautions Prevent Salami Spoilage

Risks of microbiological spoilage in salami can be reduced to a minimum if certain precautions are observed, based on the inherent characteristics of the product. Being made from raw meats, salt, and spices, filled into casings, and then held for long periods of drying and maturation, salami is to be regarded as a perishable product subject to spoilage that may be a menace to health. Such spoilage is possible at any stage of processing, and especially before moisture content is reduced to a level, or when the product is stored at a temperature at which microbial growth is impossible.

First consideration should be given to the selection of sound meats. Too much fat is inadvisable. During trimming, chopping, mixing, and filling into casings, the temperature should be kept below 50 F., and then preferably at 36 deg. during the 2-3 days of curing. Risk of spoilage during the drying process can be avoided by holding the

(*Turn to page* 123)

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A-11F

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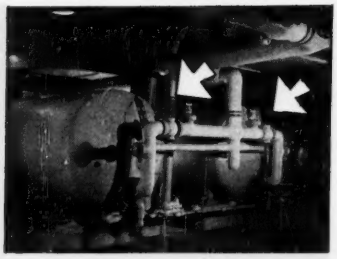
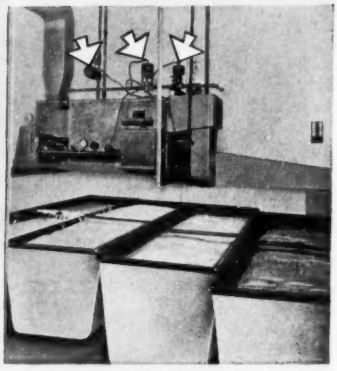
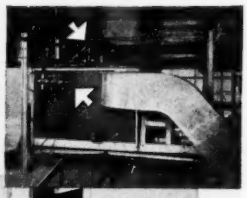


For WATER HEATERS and HEAT EXCHANGERS



For Air Conditioned Bakery Fermentation Rooms

Users report control within 1½°F. plus or minus on these two bakery processes.



For Air Conditioned Bakery Proof Boxes, above. Below: Ham Cooking Vats

temperature below 55 F. If quick drying is desired, the range should be 130–140 F.—above the temperature favorable to any dangerous bacterial growth. Whatever method of drying is adopted, it is important to dry the product uniformly and to avoid "case-hardening." Extent of shrinkage during drying will depend on initial moisture content of the ingredients and, to a large extent, on the percentage of fat present. The author has tabulated data showing the shrinkage and final water content necessary to produce concentrations of salt-plus-ash in the aqueous phase, to protect the product from growth of dangerous bacteria and to inhibit mold growth.

To maintain the desired moisture level in storage, paraffin wax, either alone or mixed with rubber-like plastics, and micro-crystalline waxes may be applied direct to the product, as may watery emulsions of plasticized plastics impermeable to water vapor. Rubber bags may also be used for holding one or more sausages. Storage at too high a temperature will cause the fats to become rancid, and too high humidity may cause molds to grow on the surface of the coatings.

Digest from "Notes on the Processing and Storage of Salami Sausage," by W. A. Empey, Food Preservation Quarterly, Vol. 9, 27-30, June 1949.

MISCELLANEOUS

Process Removes Caffein From Coffee Extract

Decaffeinated soluble coffee is produced by a recently patented process. In operation, a 40-50 percent extract of ground, roasted coffee is produced by percolating with hot water and, if necessary, additional concentrating. This extract is cooled, mixed with a volatile organic water-immiscible solvent for caffein (such as benzene, methylene chloride, di- or trichloroethylene or ethylene chloride), and allowed to separate into decaffeinated extract and solvent-caffein solution. Solvent entrained and dissolved in the extract is removed by a steaming and distilling operation when the extract is to be sold as a liquid, or is removed together with the water in a vacuum drier when it is to be sold as a powder.

Caffein is separated from solvent in a distillation-recovery unit from which the solvent is returned to processing. It is recovered as a residue, recrystallized, and purified for sale. The process may be performed continuously or batch-wise.

Digest from U. S. Patent 2,472,121, issued June 7, 1949, on an application dated Nov. 14, 1945, to John Ornfelt, assigned by mesne assignment to American Home Foods, Inc.

—End

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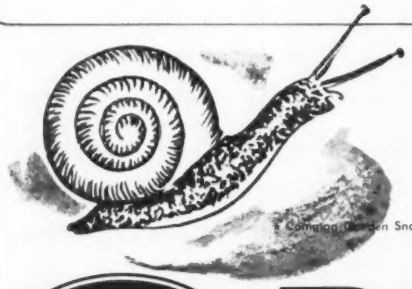

* Common Garden Snail

** Wood Duck (Male)

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MEAT
Packing - Locker
Retail

DAIRY
Butter - Cream - Cheese
Ice Cream - Milk

FISH - FRUIT - FROZEN FOODS
POULTRY - SHORTENING
VEGETABLE

*The common garden snail, *Stylommatophora*, is no beauty, but his shell is tops in protection for his tender body.

**Most beautiful of all ducks is the wood duck, *Aix sponsa*, which builds its nest in hollow trees, often far from water.

Kalamazoo Vegetable Parchment Company

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Canners Eye Costs and Quality

Sessions center on quality and management problems while exhibits offer cost-lowering equipment

Quality control was stressed by speakers at the 43rd annual convention of the National Canners Association. Franklin J. Lunding, president of Jewel Tea Co., Inc., the first speaker at the opening session, pointed out that the three factors which add up to good merchandising are price, quality, and goodwill.

Price, he said, is partly a matter of skill in buying but even more a matter of efficient operation. Quality is something the canner must provide at the right cost. Goodwill is the most difficult. No merchant can buy it. He has to earn it. And when he does, he earns it not merely for himself but also for producers.

Consumers are loyal to canned foods, he stated, but not to a point where they overlook price and quality. He urged canners to watch price and quality relationships between their products and competing items.

Consumer Comes First

Secretary of Commerce Charles Sawyer told the canners that at every council table around which negotiations between labor and management are conducted, the consumer is the unseen, though deeply interested, party—yet no one pleads on his behalf. Enlightened management and labor, he went on, should know what the consumer's interests are. They will both fare better by giving him the fullest consideration.

In addition to management and labor, Secretary Sawyer said that the welfare of the consumer must be in the mind of the farmer when he asks for public support of agricultural prices. The interests of the consumer must be of first concern to the government as it attempts to bring about a balance among the various groups that produce the goods and services.

E. J. Cameron, director, Research Laboratories, National Canners Association, Washington, D. C., disclosed new findings on the essential amino acid content of canned fish. Results of microbiological assays for the essential amino acid content of canned fish products indicated that heat processing did not affect them significantly.

The essential amino acid patterns for the various canned fish products are very similar. Lysine and threonine predominate in all samples, at times reaching more than 100 percent of the recommended daily intake. Isoleucine, leucine and valine follow fairly closely. Methionine, phenylalanine and tryptophan run somewhat below 50 percent, but are still present in substantial amounts.

F & WS Split?

An enthusiastic group took in a heated panel discussion that weighed the question, "Should the Hoover Commission's Fishery Recommendations Be Adopted?" Much interest centered on the Commission's proposed splitting of the Fish & Wildlife Service—calling for a shift of the fish unit out of the Department of Interior. Donald P. Loker, director, Public Relations & Labor Relations, French Sardine Co., favored transfer of fisheries to the Department of Commerce where, he pointed out, it functioned very well for many years during the growth of fisheries.

HENRY P. TAYLOR, of Taylor & Caldwell, Inc., Walkerton, Va., is the new president of National Canners Assn.

A middle-of-the-way course on the issue was taken by Robert O. Beatty, conservation director, Izaak Walton League of America, Inc. He said that his organization favored a Department of Natural Resources and would support legislation for this department regardless of whether fisheries and wildlife were separated.

C. R. Gutermuth, vice-president, Wildlife Management Institute, Washington, D. C., was against the split. If the eventual reorganization follows the recommendations of the Hoover Report, he said, those interested in fish and wildlife would be confronted by a dilemma: Fish and wildlife are affected by both land and water management. Thus, if the report is followed, water development would be in one agency and land management in another. And in that case, the fish and wildlife unit, wherever it is placed, will be faced with the necessity of working across departmental lines to secure proper management. He concluded that establishment of a Department of Natural Resources comes nearer to meeting the requirements of a sound, nation-wide conservation program.

Albert M. Day, director, Fish & Wildlife Service, Department of Interior, was against the proposed separation. He invited members of the industry who are not satisfied with the accomplishments of the Fish & Wildlife Service to tell the Service and Congress what it is that they want, but are not getting, in the way of accomplishments.

The accident frequency and severity rating of the canning industry is high—about 100 percent above the national average—and is due to the necessarily short and fast peak seasons, requiring hiring of large numbers of temporary employees, in the opinion of E. G. Hutzley, safety and fire prevention engineer, Campbell Soup Co., who opened the canners' problems conference.

"But," he said, "nine out of ten accidents happen because an unsafe act of a worker is coupled with an unsafe mechanical or physical condition," and most of these situations can be prevented. In his opinion, 30 to 90 sec. personal contact talks and visual education briefs are the best safety tools. The supervisors, he added, are the key men of any safety program.

In discussing dielectric heating, M. P. Vore, section engineer, Electronics & X-Ray Div., Westinghouse Electric Corp., said: "It seems inevitable that a tool with the outstanding properties of producing heat within a material quickly, cleanly, and uniformly, will eventually find good uses in the food industry."

He pointed to two possibilities for the application of dielectric heating to

the sterilization of foods. One is straight dielectric heating to a high enough temperature to achieve sterilization. And the other is the use of the lethal effect of high frequency fields on food contaminating organisms.

The first application "is likely to be limited to fairly homogeneous substances" and, since it is more expensive than steam heating it will be practicable only when economies in handling result, or if a superior product is produced that will command a premium price.

Regarding the second possibility, lethal effect of high frequency fields is not fully established, he said, and considerable research will have to be done to evaluate it.

P. J. Chapman, head, Div. Entomology, N. Y. State Agricultural Experiment Station, emphasized the need for all parties involved to participate in the spray-residue hearings now being held in Washington, lest tolerances be established which are too low for adequate pest control. "Future regulations," he said, "will be based on facts put into the record in these hearings." And any group will have itself to blame if important facts affecting the welfare of its activities are not presented.

Concerning insecticides, Dr. Chapman felt that efforts should be directed toward finding materials that exhibit greater differential toxicity to insects and man.

In making the rounds of the Canning Machinery & Supplies Association exhibit, canners saw displays that included labor-saving machinery and supplies. In the Anchor Hocking booth, they witnessed the 16-spindle rotary machine for vacuum sealing glass jars at 625 jars a min.—an increase of 125 jars since the machine was exhibited last year.

New Jersey Machine Corp. displayed its automatic Label-DRI unit that, without use of glue, applies plastic-coated labels to jars and bottles at the rate of 75 to 330 a min. This company also exhibited its new round-can labeler with the simple top label feed for non-stop label loading.

Berlin Chapman Co. featured its new Bott retort loader and unloader, capable of loading 300 cans a min. and unloading 600 cans a min.

Food Machinery & Chemical Corp. displayed a new air blast can dryer that permits thorough drying of cans cooled down to room temperature. Also exhibited by FMC was the new Sterilmatic process which combines the advantages of high temperature and rapid continuous cooking for producing a superior color and flavor of cream style corn. This company also showed a new detector which spots and rejects bright cans, and also cans which have misaligned or loose labels. Shown, too, was a 10-pocket heavy duty filler featuring stainless steel parts. This unit is for use in conjunction with the new FMC sanitary cooking equipment for cream style corn.

Chain Belt Co. of Milwaukee featured the new Rex Roto-Brush can cleaner and dryer. A non-electric, permanent magnetic light can eliminator was on display in the Columbia Engineering Service booth. And at the Hope Machine Co. booth, canners saw a new jar-filling machine featuring better sanitation as well as other improvements.

G. Palmer & Associates displayed an electronic can ejector that takes out loose-label cans. The Peeling Co. revealed its automatic tomato unit that peels scalded tomatoes without use of steam, lye or similar agents.

The United Co. displayed a new sanitary mixer for use with cream style corn. This unit is constructed of stainless steel and has welded, polished joints. All food-contact surfaces are accessible for thorough cleaning. This company also displayed a new can shaker that handles cans of different sizes and that avoids any metal-to-can contact, thereby affording quieter operation and reducing any damage to the container.

Pfaudler displayed a filler for 1 gal. containers. It is capable of handling 90 gal. per min.

Lee Metal Products Co., Inc., had an hydraulic lift on the floor for dumping 500-lb. 54-gal. barrels of materials into kettles.

Tri-Clover Machine Co. exhibited a new streamlined stainless steel "Y" pipe fitting.

Taylor Instrument Companies exhibited a new fast acting temperature transmitter which minimizes the lag in the sensing element. Also displayed was a low-cost temperature and venting control unit for batch retorts.

New Foods

Many new food products were introduced at the National Food Brokers Association Convention. Kingan & Co., Indianapolis, came out with smoked pork sausage in a 7-oz. can, lima beans and ham in a 16-oz. can, and beef and noodles in a 16-oz. can. Helwig & Leitch, Inc., Baltimore, introduced its "Stickles"—firm pickles cut lengthwise into wedges with the ends cut off square. Also added to its line are "Majestic" sweet garnished gherkins and a special gift package of six assorted jars of pickles, relishes and mayonnaise.

Servit Foods, Inc., New York City, revealed its "Servit Instant Punch Ade" that requires only adding of water to make it a flavored beverage. Almond-stuffed and anchovy-stuffed Spanish olives were introduced by A. C. Haase Co., St. Louis. Joselli Fine Foods, Inc., New York, showed "Benton's Kokonut Spred", a homogenized sugar, chocolate and coconut product. This may be used on bread or as a filling and topping for cakes, ice cream and desserts.

Henry P. Taylor, head of Taylor & Caldwell, Inc., of Walkertown, Va., was elected 1950 president of the National Canners Association. He succeeds John F. McGovern, of the Minnesota Valley Canning Co., Le Sueur, Minn. Herbert J. Barnes, vice-president of the Kaysville Canning Corp., Kaysville, Utah, was chosen vice-president of the NCA.

Freezers Dig Into Costs

All branches of the industry emphasize the importance of improving operating methods to bring costs down

A 1949 increase of 38 percent in tonnage-consumption of frozen foods over 1948 was reported at the National Frozen Food Industry annual convention held in Chicago, January 31 to February 3. A similar increase is expected for 1950. The sales volume of $350,000,000 for 1948 was increased to about $460,000,000 during 1949.

Wm. M. Walsh, president, National Wholesale Food Distributors Assn., and convention chairman, attributed the rapid growth of the industry during recent years to an increase in number of retail outlets and to the increase in number of low temperature units in homes. Surveys have shown frozen foods to be displayed and sold in more than 75 percent of all retail stores in the cities studied. As many as 1,200,000 home freezers were estimated to be in use during 1949. Frozen food locker plants were reported to number 11,000—double the number in 1945.

Continuing the working partnership established last year among all branches of the industry, the convention further served to merge the interests of the National Assn. of Frozen Food Packers, National Wholesale

FLORIDA was chosen by the National Frozen Food Distributors Assn. to receive this year's distinguished merit award. Mrs. Fuller Warren, wife of the state's governor, is seen accepting the award from W. M. Walsh.

Frozen Food Distributors Assn., National Preservers Assn., National Food Brokers Assn., and Assn. of Refrigerated Warehousemen. The packers, distributors and warehousemen each held their annual meetings during the convention. No central exhibition of products, equipment, and supplies was held. Private exhibits were shown in the hotel rooms instead.

The most popular frozen items during 1949 were listed as: 1. Frozen orange juice concentrates, 2. peas, 3. strawberries, 4. lima beans, 5. snap beans, and 6. spinach.

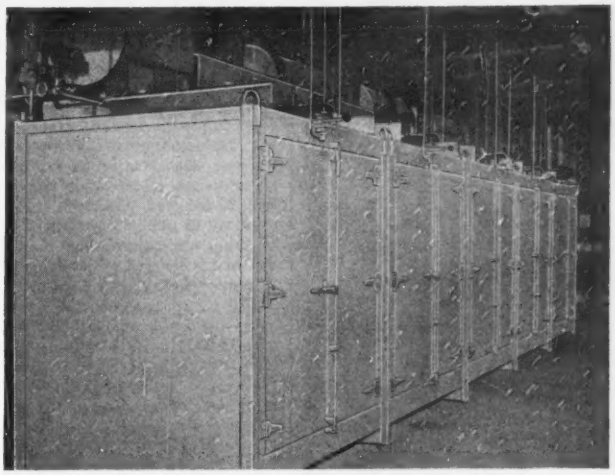
Relation of sales of frozen foods to sales of fresh foods, by percent, is indicated in the table accompanying this article.

Basic Items

W. L. Pavlovski, past president, Chicago Quick Frozen Foods Assn., cited five basic items—frozen fruits, vegetables, poultry, fish, and juice concentrates—to be the industry's bread and butter for at least the next ten years. Other items such as frozen pies, complete meals, and the like, are expected to continue and to be developed as specialty items but not to be as contributory to the growth of the frozen food industry as the mass-sale of basic foods.

Recognition of the contribution of frozen orange juice concentrates to the frozen food industry during 1949 took the form of a distinguished merit award plaque presented to the wife of Governor Warren of Florida. For the first time, this award was given to a state instead of to an individual or a corporation. Cited was "the work done by Florida in the development of frozen orange juice concentrate, the

5 of the 10



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biggest single event last year." It may be noted that one-third of the current Florida orange crop is expected to be marketed as frozen concentrates.

Frozen orange juice concentrates are credited as representing 12½ percent ($57,500,000) of all frozen food sales. During 1950, they are expected to account for about 25 percent of all frozen food sales.

The panel discussion on distributors' operating costs resulted in agreement that the industry must: Concentrate on building small retail sales into greater volume sales outlets; cut administrative costs; and eliminate such high overhead as is now represented by use of public warehouses where the full 30-day rate is charged on products seldom stored for more than 2 days.

The panel agreed that the medium-sized distributor suffered most, with a 17.5 percent cost. Small distributors have an operating cost of about 15.6 percent of gross income, while the large wholesalers come close to the industry average of slightly more than 16 percent.

Another point of agreement is that independent retail sales outlets account for 75 to 85 percent of total sales volume in frozen foods, as compared with chain store volume of 15 to 25 percent, and that preferential pricing for chain stores does not seem feasible because chains cannot purchase and distribute to the consumer through retail outlets any more economically at present than do the existing frozen food wholesale distributors.

J. L. Heid, director of research and development, Florida Citrus Canners Cooperative, emphasized the role of research in evaluating risks, avoiding errors, and determining advantageous methods and channels for introducing new products. He summarized by stating that the "research departments of food manufacturing organizations can serve more effectively in introducing new foods by cooperating with the production and merchandising divisions, from the inception of an idea to the establishment of profitable markets."

A. W. Dutcher, National Assn. of Frozen Food Packers, emphasized that requests for the setting of standards for a food product must be supported by facts. Unsupported statements or expressions of opinion, no matter how plausible, have no merit. He cited the mechanics of obtaining information for the frozen asparagus and peas standards hearing, saying these comprised an example for all frozen foods.

John H. Mac Vey, counsel, NAFFP, stated that state legislation is becoming more and more applicable to frozen foods and that the Bureau of the Budget is studying the Hoover Commission recommendation for the reorganization of the Food & Drug Administration by separating the Food Administration from the Drug Administration.

Research Support

H. C. Diehl, director, Refrigeration Research Foundation, pointed out that an industry which does not employ research to protect and advance its customers' welfare is setting the stage for economic failure. He reminded his audience that the frozen food industry has been fortunate in having had aid and support from fields other than the frozen food industry. He made a plea for a continuing industry directed and financed research program as contrasted to a sporadic or isolated research program. Areas still to be studied by research were cited to be:

1. Raw materials quality, with special attention to varieties suitable for freezing. 2. Quality standards in the industry. 3. Processing problems. 4. Packaging problems. 5. Current daily production problems. 6. New fields of endeavor.

Joseph P. King, agricultural manager, Birds Eye-Snider, focussed attention upon the importance of packers understanding the cost problems of the growers and of growers understanding the cost problems of the packers and freezers. He stressed the role of the head field man in the relationship between the growers and the packers or freezers and identified him as being too often the forgotten man in the management team. He has found that the growers will cooperate with the processors if they understand the needs of the processors and that the field man is the individual to make the growers understand. Scheduling of harvesting and processing was stated to start with the planting schedule.

Roy Hagan, president, California Consumers Co-op, recommended pack records as valuable aids in handling consumer complaints as well as in making plans for the following year and determining what should be done to im-

TABLE—RELATION OF SALES, Percent Frozen to Fresh Foods, 1938, 1948, and Projection to 1958.

	1938		1948		1958	
	Frozen	Fresh	Frozen	Fresh	Frozen	Fresh
Strawberries	11%	89%	27%	73%	41%	49%
Cherries	16	84	38	62	62	38
Peas	7	93	37	63	74	26
Lima beans	20	80	48	52	78	22
Oranges (juice)	5	95	11	89	93	7

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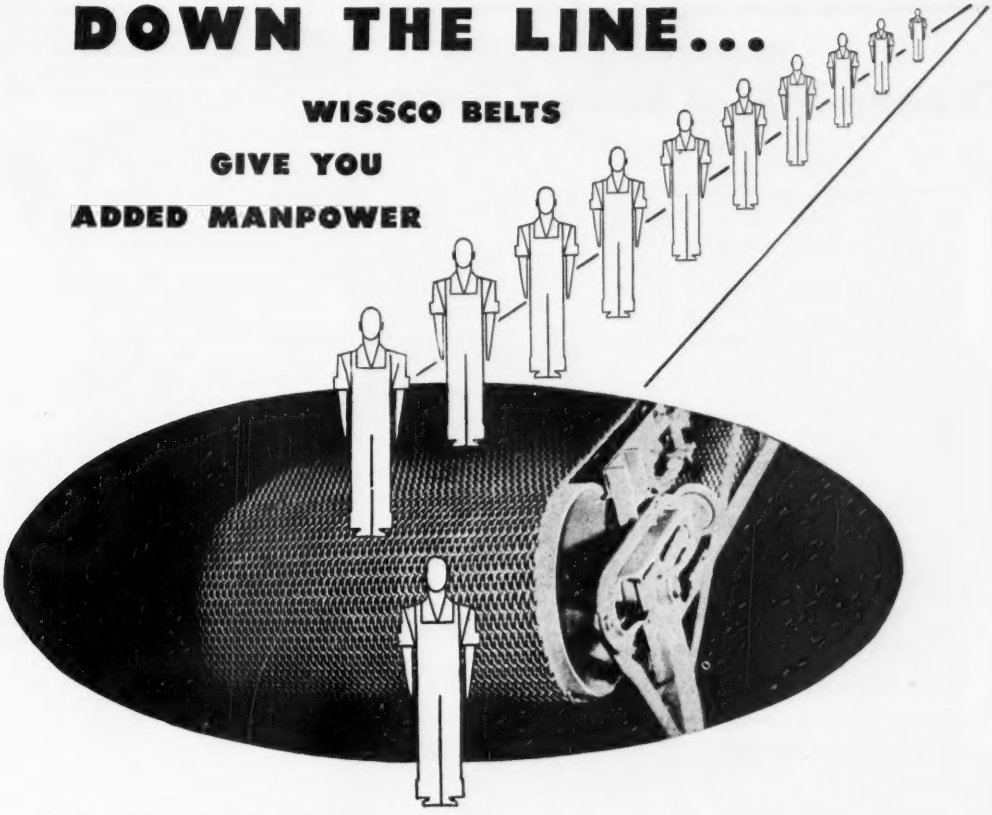

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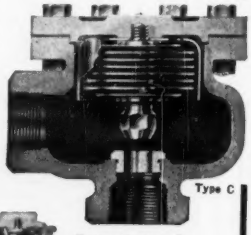

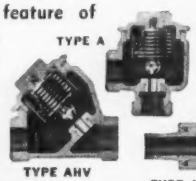

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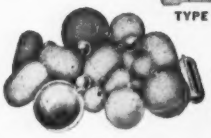

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prove operations and to prevent repetition of mistakes. Records used by his company, and recommended, are:

1. Daily raw produce reports for each grower, prepared by quality control department.
2. Daily finished products report, prepared by quality control department and used by the USDA grading service as basis for grade certification.
3. Daily production record, prepared by the plant accounting department.
4. Daily cost data, available by noon of following day to give reliable running cost record, prepared by company accounting department.
5. Storage and shipping record by lot numbers and codes, prepared by warehouse superintendent and USDA grading inspector.
6. Completed pack cost record together with a recap of history of crop, harvest time, and conditions and pack, prepared by cost accounting department.

He suggested periodic review of forms to determine desirability of their continuance or replacement, and he emphasized that all statistical records should be kept for their interest and value to the production department.

Speed and Care

Harold Emerson, manager, Cumberland Warehouse Corp., Seabrook Farms, stated that the mechanics of handling materials in production and storage are based on speed and care—speed from harvest to processing, and care to prevent bruising, other damage, and long holding.

Handling methods should vary according to physical layout of plant. Pallets and lift trucks are most suitable if plant layout permits. Otherwise, manual handling can be as advantageously used if advantage is taken of well-chosen containers and conveyors.

He recommended that quick-freezing plants be contiguous to refrigerated warehouses and connected by direct conveyor. If warehouse contiguity cannot be arranged, the plant should include a 0 deg. F. holding room for temporary storage. Cost of handling materials by pallets and fork truck should be compared with flexibility and cost of operation by manual handling, keeping in mind speed and care.

E. W. Eickelberg, Fairmont Canning Co., reviewed the progress made in the layout of production lines and design of equipment that foster increased production in existing plants and lowering of production expenses resulting from high labor costs. No building of new freezing plants is anticipated for 1950, but much modernization and revamping of existing plants are almost imperative.

—*End*

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Take a gallon of Barreled Sunlight and compare it with a gallon of any other paint. Thin each according to directions on the can and try them on a wall. Measure the yardage you get from each. Compare the final results in brightness and thorough coverage. Most of all, if you're truly price conscious, clock the painting time for each paint...for labor time today represents 80% of the cost of any painting job.

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Food Industry News

Sharp Decline in Farm Income Now Has All Sides Worried

The slide in farm buying power will be shored up with more money for Commodity Credit Corp., the Government's surplus buying agency. Even so, politicians fear powerful farm belt reaction to already sizable cutbacks in the income of farm families.

Government has invested about $3,000,000,000 in surpluses in the last two years to keep the farmer's prices up. Secretary of Agriculture Brannan says it may take another $3,000,000,000 when the 1949 and 1950 crops are all in.

But farm income has already dropped sharply. Gross income, the dollar sales of the farm industry, will be down again this year—$5,000,000,000 below the 1948 peak, a drop of 15 percent. Net income, the farmer's profit, will also be down about $5,000,000,000 from the 1947 peak of $17,500,000,000.

High Costs Remain

Reason for the sharper drop in net income is that farmer's cost of production stays high. The experts figure farmers this year will spend within 3 or 4 percent of what they did last year for things like feed, lime, fertilizer, gasoline, repairs, power, insurance, insecticides, twine—and taxes.

Farmers are not hollering, yet. But the pinch is beginning to hurt, and farmers are keeping a sharp eye on politicos who tinker with their diminishing prosperity.

Point is this: The prices or products accounting for two-thirds of the farmers' cash income are kept up by government support-price buying (covering grains, tobacco, cotton, oil crops, pork, poultry, eggs and dairy products). So, with elections coming up, don't look for either Brannan or farm-bloc congressmen to shrink from anything that will help keep farmers' returns high.

High cost of subsidies to keep prices from sagging intensifies the scramble for some acceptable and workable farm program. Present law obviously is not the answer. And almost everyone denounces the only real alternative so far—Brannan's plan.

Brannan's estimate of a $6,000,000,000 government investment in surpluses in another year or so may be touched up some by his desire to blacken the present law. But the figure is not at all impossible.

Critics point this out: While price supports of this magnitude are supposed to benefit farmers generally, actually the top 1.7 percent of the nation's 5,800,000 farms produce 24 percent of all farm marketings, and the top 10 percent produce 50 percent of all marketings. Thus, it's really only a fraction of the farmers who get the whopping big benefit from the support spending.

Frozen Food Foundation Completes Research

With its quality testing program completed, the Frozen Food Foundation has discontinued its research laboratory, according to the Foundations' president, Charles W. Foulds, divisional merchandise manager, Marshall Field & Co.

Observing that the basic purpose of the Foundation was to help its members develop retail operations, Mr. Foulds pointed to the greatly improved standards of quality now maintained by the major frozen food packers. This improved situation, he said, made continuation of the laboratory by a private institution no longer a necessity.

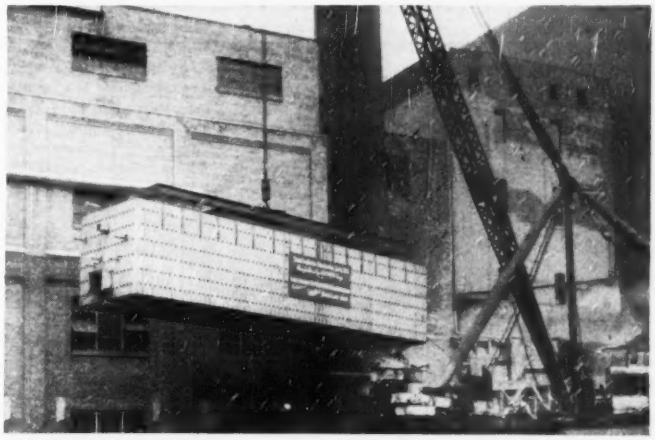
Developed from what had been the Frozen Food Institute, the Foundation has been established since 1945, with headquarters in Syracuse, N. Y. It is sponsored by a number of the nation's leading department stores. Dr. Gerald A. Fitzgerald, who had directed the work of the laboratory, continues as the Foundation's secretary.

Bowman Dairy Executives Go Back to School

Top management men of the Bowman Dairy Co., Chicago, have gone back to school. Members of the administrative staff of the production divisions are learning conference leadership technics in the University of Illinois Labor & Industrial Relations Extension Courses. Upon completion of the course, the "students" will use the methods learned to conduct employee meetings in Bowman plants.

As an outgrowth of this course, the company, one of the largest independent dairy firms in the country, will use a five-phase program in its employee meeting plan. The phases are: (1) Problem solving conferences, (2) interpretive conferences, (3) consulting conferences, (4) informal group meetings, and (5) informational conferences.

The course emphasizes the importance of varied approaches to conducting employee meetings. Sales managers and plant managers are also taking extension courses.



Brewery Tank

As part of a $15,000,000 expansion program, 90 stainless steel tanks are being installed in the new stockhouse of the Miller Brewing Co., Milwaukee. This picture shows the first tank as it was swung into position at the site of the new building.

Food Practice Confab Sponsored by FTC

A wide variety of trade practice rules for the food industry were suggested by representatives of the manufacturers, wholesalers and retailers at the conference sponsored by the Federal Trade Commission in Washington last month.

Result of the meeting was the formation of an advisory committee to meet with FTC staff members in working out proposed rules, which will be published, reviewed at another public meeting, and then promulgated.

The only rules submitted to the meeting were those drawn up by the National Association of Retail Grocers —14 in all—covering such things as discriminatory prices, rebates, brokerage payments, advertising and promotion allowances, loss leaders, selling below cost, fictitious prices, and a number or other unfair trade practices.

Other suggested rules were proposed during the discussion—most of them aimed at price discrimination, and advertising allowances, and other pricing practices that have long been a bone of contention in the grocery field.

Among those present at the conference were: C. C. Preeure, president, and Tyre Taylor, general counsel, of the National Association of Retail Grocers; Harold Smith, executive vice-president, and William Quinlan, general counsel, U. S. Wholesale Grocers Assn.; M. I. Toulme, vice-president American Wholesale Grocers Assn.; Watson Rogers, National Food Brokers Assn.; Ed Wimmer, National Federation of Independent Business, Inc.; Paul Willis, president, and Charles Wesley Dunn, general counsel, Grocery Manufacturers of America; Joseph Cavanaugh, American Institute of Food Distributors; and John Logan, National Assn. of Food Chains.

Of those who addressed the meeting, a majority spoke favorably of the purpose for which the meeting was called. Privately, however, most of the executives present questioned the practical effect of the FTC rules. Net impact is mainly that of publicity, calling attention to FTC's activity in this field.

One point that was generally skirted during the meeting was the fact that the rules promulgated 20 years ago had little or no impact on any trade practices. Instead, the discriminatory pricing practices were dealt with by Congress with the passage of the Robinson-Patman Act in 1936.

FTC trade practice rules are not enforceable, as such. However, the rules do spell out what FTC interprets as violations of the Robinson-Patman Act, Federal Trade Commission Act, and other business regulation laws it carries out. They serve as a guide for sellers and buyers.

But most companies are more apt to look to decisions on enforcement cases brought into the courts for the last word.

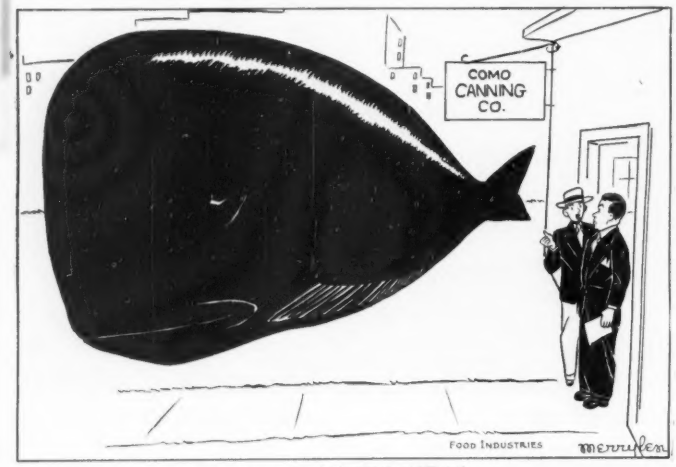
Frozen Milk Experiments Reported by Borden

Experiments on concentrating and freezing fresh milk have been carried on by scientists of the Borden Co.'s Chicago milk division for more than a year, according to a recent disclosure by Oliver O. Smaha, president of the division. They have tried concentrating milk in various degrees—50, 60, 75 percent, and other ratios, then freezing it quickly after concentration, he said. Various freezing processes were used, some of them similar to those used in orange juice concentration.

"We have already been able to concentrate and freeze milk which has the nutrition contained in bottled whole milk," President Smaha said. "We have not been able, however, to come up with a product which has the exact taste appeal of bottled whole milk. But our experiments lead us to hope that we can eventually produce concentrated frozen milk which will be equal in every way to bottled whole milk.

"We are continually making tests of the keeping quality of the frozen milk," Smaha continued. "Of course, none of the processes have been perfected, and a great deal more experimenting must be done. A frozen, concentrated milk probably would result in savings to the consumer because of savings in distribution. There would not be the same savings in transportation of milk in the Chicago area that there would be in the case of orange juice, because milk is produced close to Chicago, while oranges are produced hundreds of miles away. There should be savings in transporting milk from the processing plant to stores or homes because of the lesser weight to be carried."

Another great advantage of frozen, concentrated milk, Smaha said, would be that it would greatly expand the market, especially for the midwestern dairy farmer, by making it possible for consumers to obtain fresh milk in areas where they cannot now get it.



"I'D LIKE AN ESTIMATE."

Louisiana Sugar Co-Op Liquidates Plant

The Waterford Sugar Cooperative, Inc., sugar mill at Killona, La., has now been liquidated, according to an announcement by F. Evans Farwell, vice-president of Milliken and Farwell, operators of plantations and sugar mills.

Farwell predicted at least five other sugar plants would go out of business. The others, he said, "Won't be able to operate next season and they'll have to liquidate soon. The price of sugar is simply too low and we can't make any money."

Farwell said that according to the commodity index, the price should be 80c. per hundred higher than the present prices. "With 75c. an hour minimum wage staring us in the face," he said, "there was no alternative but to liquidate."

He was named one of the liquidators of the Waterford plant at a meet-

Production Manager

Richard S. Light is Clinton Foods new production manager. His duties cover all products, including the Snow Crop, Hi-C, and NuSweet lines. He was formerly manufacturing manager and head of plant-expansion work at Lever Bros.

ing of members and preferred stockholders at Killona. The vote to liquidate the 18-year-old mill was unanimous. Built at a cost of more than $300,000, it operated for 13 years, grinding an average of 80,000 tons annually.

Food Utilization Research Proposed at Meeting

A new organization to provide technical counsel on the utilization of new materials in the production and processing of foods was considered at a conference recently held in Washington under the auspices of the Food & Nutrition Board of the National Research Council.

The conference was called by the Food & Nutrition Board for the purpose of bringing together the representative viewpoints of government, agriculture, the food and chemical industry, and public health. Among the subjects discussed in the all day session were the use of newer chemicals in the production of an adequate food supply, the introduction of functional ingredients in food processing, and the need for further knowledge in the application of these newer aids in agriculture and food technology.

By unanimous action the conference requested the chairman, H. E. Longenecker, to appoint at an early date a committee to complete organizational and operational plans for approval of various groups interested in the problem. Dr. Longenecker emphasized the desirability of cooperative

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Candy Research

With the National Confectioners Assn. cooperating on candy storage research at the Georgia Experiment Station, these industry leaders recently attended a special meeting at the station. Seated (from left) are: B. Lloyd Woodall and H. G. Ritchie. Standing: G. Lloyd Latten; J. G. Woodruff, food technologist at the station; Philip P. Gott; and R. L. Henderson. Mr. Gott is president of the association.

action by industrial, government, and other research organizations in providing the scientific guidance required for protection of the food supply with regard to both adequacy and safety.

It is anticipated that food producers and processors, the chemical industries, and the various professional organizations will be invited to participate jointly in this new activity.

Beet Sugar Waste Water Salvaged at MIT

Development of a new process of waste treatment which promises more efficient beet sugar manufacture, has been revealed by Massachusetts Institute of Technology. The process, now in use in two sugar beet factories one in Ohio and one in Michigan, has the combined advantages of increasing sugar yield and eliminating an important source of stream pollution, according to Clair N. Sawyer, associate professor of sanitary chemistry at MIT.

Developed at MIT under Dr. Sawyer's direction by E. A. Pearson, now of the University of California, the new waste treatment increases the yield of sugar from every ton of beets by about 4 lb. while reducing water consumption by at least 320 gal.

If adopted by all the nation's sugar beet mills to which it is applicable, Dr. Sawyer estimates the new process could save more than 20,000 tons of sugar a year and eliminate a source of pollution, which annually involves about 3,000,000,000 gal. of waste water. This is equivalent to increasing the nation's sugar supply by the amount normally produced from 9,000 acres of sugar beets.

In the conventional beet sugar process, 300 to 500 gal. of waste water are accumulated for every ton of beets. This process waste water contains many bacteria and a considerable amount of organic material that is subject to odorous decay, and it is therefore a most objectionable waste product.

The daily volume of such waste, from an average mill under conventional operations during the processing season, is 300,000 to 1,000,000 gal. Disposal of this waste without endangering health and water supplies is often a most difficult problem.

Dissolve Chlorine

Under the new method developed in the laboratories of the MIT department of civil and sanitary engineering, a very small amount of chlorine is dissolved in the mill's process waste water. This chlorine destroys bacteria and acts chemically to make possible rapid separation of the non-sugar impurities. The small concentration of valuable sugar that remains in the water can then be recovered, since the chlorine-treated water may be re-used for sugar extraction instead of being discharged as waste.

Thus the new process both captures the sugar left behind in the water and reduces by about 30 percent the amount of fresh water required at the mill. It promises to become an important aid in protecting and conserving water supplies in sugar beet areas.

Preliminary economic studies indicate, according to Dr. Sawyer, that savings during the first year of operation should be sufficient to pay the cost of the necessary new treating equipment.

MIT Gets $1,000,000 Grant From Campbell Soup

Campbell Soup Co. has made a grant of $1,000,000 to the Massachusetts Institute of Technology to be used to support the Institutes research program in the fields of biology, food technology, and related scientific and engineering subjects.

This grant is one of a group of industrial MIT grants that now total over $4,000,000, under a plan whereby MIT extends to the companies full opportunities to keep abreast of new developments in science and technology.

MIT's president, James B. Killian, Jr., has revealed the Institute's decision to construct a new building to house the departments of biology and food technology. The building will be named in memory of John Thompson Dorrance, of the class of 1895, who was president of Campbell Soup from 1914 until his death in 1930.

Lower Cost Spinach Tested in Florida

Production of spinach at half the present cost of the raw product may soon be a reality. A new tropical leaf plant, called "Florida Spinach", is undergoing canning and freezing tests before its general release to processors. It can be grown in the Belle Glade, Fla., region for $25–$40 per ton, with the possibility of even lower cost as the acreages increase.

European spinach, it is stated, has been losing its popularity gradually. The medical profession frowns on its oxalic acid content; processors do not like the large amounts of water necessary to clean it for processing; government officials watch it constantly because of its insect attraction and consequent spray residue problems; and the customers dislike its "typical canned taste".

The new Florida spinach was introduced into the United States by J. J. Oeshe, professor of tropical botany at the University of Miami. The plant is a native of Java and has been

Better Spinach

Tropical-type spinach being developed for processing in this country is here examined at Belle Glade, Fla., by E. H. Barchardt (left), J. J. Osche, and D. R. Dixon.

an important item in the diet of East Indian population.

The plant thrives in sub-tropical conditions and grows in all climates and altitudes in warm weather. However, the plant is tender and will not withstand frost. Production of seed is limited to the sub-tropical sections of the country.

Spice Group Establishes Antioxidant Study

Establishment of a research fellowship at the Hormel Institute, Austin, Minn., to study the antioxidants of natural spices, was announced recently by Lester W. Jones, president of the American Spice Trade Association, which is backing the project.

The research committee anticipates that a preliminary evaluation can be completed within a year, under the supervision of W. O. Lundberg, director of the Hormel Institute, who will employ either the full-time services of a Ph.D. chemist or the part-

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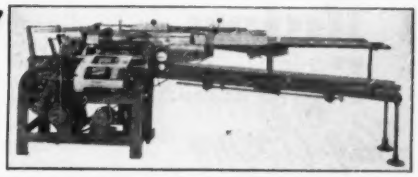

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Bag Closing Machines

Orange Juice Salesmen

Man in center is president of the Bing Crosby Minute Maid Corp., West Coast distributor of a certain product. Hamilton Stone, vice-president and general manager of the corporation, is on the left, while on the right is Ambrose E. Stevens, vice-president in charge of sales, Minute Maid Corp., New York City.

time services of a Ph.D. chemist and full-time services of a laboratory technologist.

Studies will be made using finely ground spices and various crude fractions of spices. In a description of the project, Dr. Lundberg said:

"Generally speaking, an antioxidant must be either fat soluble or water soluble to be effective in food products, and it is believed that virtually all the natural antioxidants in spices that would be potentially useful in food products could be separated from the insoluble material by one or another of these solvents. The separation of fractions with the aid of solvents will serve as a useful laboratory technique in the evaluation of the antioxidant properties of materials present in natural spices."

Spices and fractions that appear most promising will be tested in food products containing fat in which spices are normally used.

Pickle Packers Cheerful Over 1950 Outlook

Pickle Packers are bullish about business in 1950. Based upon the current rate of consumption (at an all time high), the outlook appeared very sound to those attending the annual winter meeting in New York City, in January.

The 1949 crop of pickles hit a record 12,000,000-bu. mark, but the National Pickle Week, which was innaugurated last year, was so successful that consumption hit the 1,000,000-bu.-a-month rate—and it has not slowed down, the delegates were told. The carryover this year was only 2,100,000 bu. and there is a possibility that supply might not be able to handle the coming peak demand.

For the first time, pickles have broken into the big three category of largest volume of canned products sold. It used to be peas, corn and tomatoes. Now it's peas (28,000,000 cases), corn (26,000,000), and pickles (25,000,000).

Prices Held Down

The industry boasted of keeping prices down while dollar volume was increased. According to Department of Commerce statistics, prices of pickles today are only about 29 percent higher than in 1942. The average wholesale food index is 63 percent higher in 1949 than it was in '42.

This enviable price situation was credited to the industry's research and educational program. Ways have been found to improve the quality of both raw material and finished product. Shelf life has been extended, liquor has been retained better and containers have been made more attractive. And, most important of all, savings have been passed along to the retail level. This has been accomplished even though the packer's costs have risen from 50–75 percent.

National Pickle Week will be opened in 1950 with more drive and vigor than a year ago. Theme behind the promotion will be to tell more people about pickles, display more pickles and ways to use them, and to sell more pickles

than would otherwise be possible. Plans are already made for nine different promotional meetings to be held throughout the U. S. prior to the starting gun for the NPW.

A meeting will be held in Atlanta March 13, in Baltimore March 17, in N. Y. C. March 20, Boston March 23, in Pittsburgh March 28, Chicago March 31, Minneapolis April 4, Kansas City April 6, and San Francisco April 11.

Pea Association Plans Year's Promotion

Independent pea canners attended the second annual meeting of Canned Pea Association, held during the National Canners' convention, in Atlantic City, to discuss the continued progress and activity of the association.

The association's promotional, publicity and merchandising program for 1950 was described in considerable detail. A feature of the current year's plans is the continuing progress in coordinating publicity, merchandising display material and the advertising and promotional aids which the association will serve distributors.

Recipes and menus including canned peas, which will be featured in 1950 promotion, are being planned and selected by the association's merchandising committee and agencies working

SUGAR MAY BE NATIONALISED!
Mr. CUBE says:—
A form filled now may save you hundreds later...
ASK YOUR GROCER FOR A PETITION FORM AGAINST NATIONALISATION OF SUGAR REFINING
or write to Mr. Cube at TATE & LYLE LTD., Plantation House, Mincing Lane, E.C.3

Could It Happen Here?

Sugar refiners in Britain are more than a little worried over the possibility of their industry becoming nationalized. Newspaper advertisements like this one have been appearing regularly. "Mr. Cube" is sponsored by Britain's biggest sugar baron, Lord Lyle, president of Tate & Lyle, Ltd., London. (Wide World photo)

GLOBE PRODUCTS CO., INC.

CAN PRESERVES..

and PRESERVE CANS

WITH FULLERGRIPT BRUSH

Globe Products Company, Inc., of Brooklyn, cans preserves and pie filling. To cool the heated food after it has been sealed in the cans, cold water is sprayed on the cans from above as they travel along an enclosed conveyor. At the discharge end of the conveyor there is about 1/8" of water on the top of each can.

For a method of removing this water Fullergript engineers were consulted. They designed and installed an open-spiralled Fullergript brush with a nylon brush filler. This brush does two things: first, it flicks all water from the tops of the cans; second, it has a drying action. Globe Products has eliminated not only the expense of extra labor but also enhanced the quality of the cans. This is but one example of how Fullergript has solved an unusual problem in the food industries. To learn how Fullergript can help you, simply write to . . .

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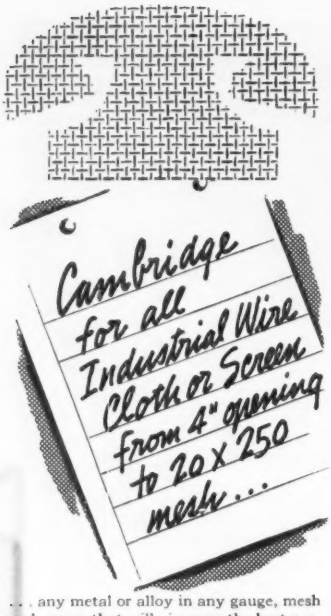

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VALUABLE BOOK FREE! A ready reference on the Cambridge line, metallurgy and simple methods of metal determinations conversion tables and other data. Write for your copy or call your nearest Cambridge office.

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Who Said Mild Winter?

This winter may not be so tough in most places, but in Seattle's Salmon Bay the fishing boats got stuck in the ice by the score. Ice on this bay is a rare occurrence, which may or may not explain why a whole fleet got caught. (Wide World photo)

in cooperation with distributors. These same recipes and menus will be featured in each phase of the promotional effort.

Directors for the current year are: F. Webster Browne, Brunswick, Me.; Glenn Finch, Newark, N. Y.; G. Bartol Silver, Havre de Grace, Md.; E. Edward Cootes, Westminster, Md.; Jas. R. Shilling, Finksburg, Md.; J. B. Weix, Oconomowoc, Wis.; G. B. Hipke, New Holstein, Wis.; Ray Krier, Belgium, Wis.; Carleton Friday, New Richmond, Wis.; Allan Weeman, Shawano, Wis.; Robert D. Baker, Theresa, Wis.; and Edward Dunlap, Plymouth, Ind.

It was the unanimous opinion of those present that the distributors and independent pea canners who actively participated in the association program last year were ostensibly aided by their work together in the association.

F&DA Food Standards

Residue tolerances were the subject of a hearing that began January 17, and recessed from January 26 to February 13 at the conclusion of testimony by USDA witnesses. An unexpectedly short time was required for this section of Part A of the hearing, because negligible cross-examination of the witnesses followed their direct testimony.

Spokesmen of State Agricultural Experiment Stations, various associations, chemical manufacturers, and others, were to occupy several weeks of hearing time after the February 13 resumption. A revised schedule of the balance of Part A of the hearing was to be issued by the presiding officer during February.

At the conclusion of Part A, devoted entirely to stating the case for necessity of use of various insecticides, fungicides, and so forth, the degree of residue encountered and its possible harmful effects will be explored. These parts of the hearing will probably not begin until late spring or summer. No broad ruling is expected to be issued with an effective date during the 1950 growing or harvesting season.

A new *color* may be added to the list of permissible coal-tar colors for use in food, drugs, and cosmetics. FD&C Violet No. 1 would be the new color, replacing D&C Violet No. 1 in the present list. February 28 was the date set for a hearing with Edward E. Turkel designated as presiding officer, by a notice on page 453 of the January 26 *Federal Register*.

Final orders on *cheeses* and *salad dressings*, and tentative orders on *frozen fruits, canned mushrooms*, and *canned corn* were still awaited at the beginning of February.

Bread standards briefs could be filed until February 10, by an extension authorized on January 16 by the Acting Federal Security Administrator.

USDA Grade Standards

Recent actions by Production & Marketing Administration of U. S. Department of Agriculture on U. S. Grade Standards and related activities include the following:

Canned spinach, second revision, proposed, page 201, January 13 *Fed-*

eral Register, written comments received until February 12.

Canned white potatoes, new, page 78, January 10 *Federal Register*, effective February 10.

Canned pineapple juice, revised, page 275, January 17 *Federal Register*, effective February 17. (Do not confuse with Food & Drug Administration proposed standards of identity, quality, and fill of container announced for hearing in October, 1950.)

Green tomatoes for processing, new, and proposed, page 515, January 31 *Federal Register*, written comments received until March 2.

Barley, revised, proposed, page 35, January 6 *Federal Register*, hearings scheduled February 14, Portland, Oregon; February 17, San Francisco; February 21, Omaha; February 23, Minneapolis; and February 24, Milwaukee; written comments received by director, grain branch, P.M.A., until March 6, Robert H. Black was designated presiding officer at the hearings, and J. E. Barr as alternate.

Millers Name Files

Howard W. Files, vice-president of Pillsbury Mills, Inc., Minneapolis, has been nominated for the presidency of Millers National Federation. The annual election will be held in April. Nomination, however, is equivalent to election, and he will become the 30th president of the organization and take office at the annual convention May 15.

Mr. Files has been with Pillsbury for 37 years and a director for 20.

Both Lay Eggs

This gent is a Paris fakir, (pronounced faker) and he is supposed to be hypnotising the hen into laying that egg. Whether the hen was hypnotised or just abashed we have no way of knowing, but on this occasion there was no egg. (Wide World photo)

FREE!

SERVICE CAP

Paperlynen Caps are adjustable to any headsize, eliminating inconveniences of shrinkage, assortment of sizes, and time wasted by each employee in selecting his size. Cost less than expense of laundering cloth caps. Light and more comfortable to wear. Distinctive with your special imprint. Millions used annually by nationally known concerns. Just mail coupon below TODAY, and we will send you absolutely FREE, a Patented Adjustable Paperlynen Service Cap.

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555 West Goodale St., Dept. C-3
Columbus, Ohio
Please send absolutely FREE, a Patented Adjustable Paperlynen Cap.
Name_____
Address_____
City_____ State_____
Name of paper jobber most frequently patronized:
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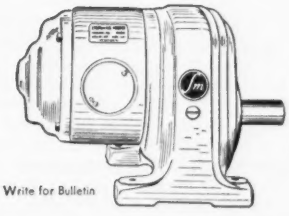
The Key to production problems

Open the door to greater production with Sterling Slo-Speed electric power drives.

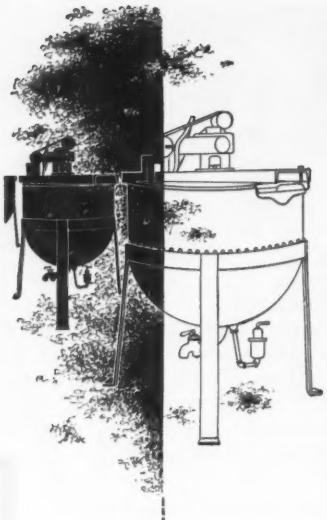


Write for Bulletin

STERLING ELECTRIC MOTORS

Plants: New York • Los Angeles • Hamilton, Canada
Offices in Principal Cities

SLO-SPEED (Geared) • SPEED-TROL (Variable Speed) • KLOSD (Normal Speed)



do you want *easier clean-ups?*

The answer to easier clean-ups is a simple five letter word, M-E-T-S-O. Try it and know how fast Metso acts on dirt and grease films; how effectively it holds the dirt suspended. Then see how it all rinses away, leaving clean, greaseless, bright surfaces.

You will agree that clean-ups are easier with Metso Detergent. It's the right combination of alkali, controlled by soluble silica that increases the rate of dirt removal, yet curbs corrosiveness.

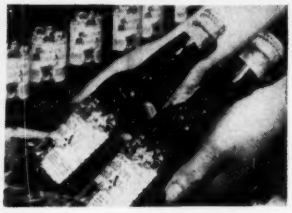
Mail the Metso trademark below, attached to your letterhead for a 16 oz. free sample of Metso.

Philadelphia Quartz Company
1148 Public Ledger Bldg., Phila. 6, Pa.

daily clean-up is **easy thorough on schedule**

METSO

metso *cleaners*



Want Honey In Your Beer?

England is shipping a new brew to the U. S.—honey blended with ale and termed mead ale. At top right, the mead ale is seen in the fermentation tank, where it remains five or six days. Brew drawn off is bottled in "American-type" bottles and labeled Golden Mead Ale (lower right). It is exported by the Hope & Anchor brewery.

Citrus Harvest Running Well Under Average

The total national supply of oranges will be about 95,000,000 boxes for the 1949–50 season, about 13,000,000 less than the three-year average for seasons since the war, the Florida Citrus Commission has estimated in explaining the price situation.

The national grapefruit crop for the current season is gaged at about 34,000,000 boxes, or about 21,000,000 boxes below the three-year average.

The commission explained that the short crop and the western freezes have cut supplies while greater demand has come from the frozen concentrate manufacturers, who used only 8,000,000 boxes of oranges last year and expect to use between 25- and 30,000,000 boxes this season.

MIT Plans 3-Week Course In Food Technology

A course in food technology will be held by the Massachusetts Institute of Technology, Cambridge, Mass., from June 12 to 30, under direction of Prof. Bernard E. Proctor. Recent developments in manufacture and control will be featured, with visits to representative plants in the Boston area.

The course will be primarily intended for advanced students, executives and employees in food industries. Subjects included will be economics and statistics of food supplies; food cost accounting and business law; food bacteriology, sanitation and fermentations; food chemistry and nutrition; materials handling; food control instrumentation; flavor and food acceptance; sterilization by electronic means; and detailed studies of bakery operations, canning, food freezing, meat packing, milling and yeast operations. A limited enrollment will be accepted.

Du Pont Develops Spray To Control Mites

A new insecticide to control mites will be available to American orchardists by March 1, according to a recent announcement by the Du Pont Co.

Mites are the tiny eight-legged pests that cost American orchardists millions of dollars every year. The new chemical weapon is the latest development in the company's wide pest control research.

Based on an organic phosphorous compound known as EPN, the new insecticide, produced by Du Pont's Grasselli Chemicals Department, has the unwieldy technical title of ethyl p-nitrophenyl thionobenzenephosphonate.

Extensive tests by some 40 investigators in 21 states, Hawaii, Canada and Mexico, confirm that EPN does two important things. It is effective against the most destructive species of

mites and affords protection against re-infestation for several weeks.

Tests have shown EPN less toxic to warm-blooded animals than other organic phosphorous compounds commonly used in mite-control sprays. However, it is still not to be classed with relatively safe compounds like pyrethrum and methoxychlor.

While only limited supplies for research have been produced previously, substantial quantities for grower use are to be available by March 1 for spring spraying.

Rice Snack Developed By Regional Lab

Rice curls, a new "snack"-type product, has been developed by the Western Regional Research Laboratory. And they are well suited for commercial manufacture, according to WRRL, because they can be made at low cost from broken rice; moreover, they store and handle well and have an attractive flavor.

To produce the curls, ground rice is stirred into hot water to form a stiff paste. The paste is then extruded through a circular orifice, cut to desired lengths, fried in hot vegetable oil, drained and sprinkled with salt and monosodium glutamate or selected flavorings.

Anti-Pollution Plants

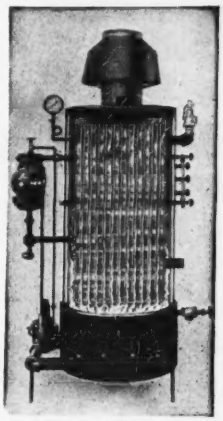
A bill which would permit manufacturers to deduct from their income tax the cost of construction of plants to prevent water pollution has been introduced in Congress by Rep. Thor Tollefson, of Washington. The bill would apply to all industry in all states. In order to qualify for the deductions, firms would have to begin construction of the anti-pollution plants before July 1, 1954. Deductions would start after completion of the plant and continue for five years.

Low Kraut Supply

As a result of high consumer demand and a low inventory, an extremely short supply of kraut threatens. At a special meeting of the National Kraut Packers Association, Art Henkel, president, said that packers reporting to the Association had only 69.1 percent as much kraut on hand December 1 as they did on December 1, 1948. Association members represent 80 percent of the industry's volume.

Actual production of cabbage for processing into kraut was only 83

STEAM —AS YOU WANT IT . . WHERE YOU WANT IT



The KANE Boiler is built to A.S.M.E. specifications, in sizes to 30 H.P.

THE KANE BOILER PACKAGE

Each KANE BOILER PACKAGE is carefully considered by us as an "individual" job,—from the customer's requirements to the finished unit. And each BOILER PACKAGE is a compact, self-contained steam source that includes: the correctly sized KANE Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure, and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

Engineered Steam at its best with four decades of experience at your disposal—so, send your steam problem to us for study and recommendation.

ENGINEERED STEAM AT ITS BEST

MEARS·KANE·O'FELDT INC.

1903-1915 EAST HAGERT STREET, PHILADELPHIA 25, PA.

FOUR DECADES OF AUTOMATIC GAS-FIRED BOILER MANUFACTURING EXPERIENCE

WITH LA PORTE FLEXIBLE STEEL CONVEYOR BELTING

You can step up every food-handling operation from the loading hopper to shipping room with La Porte Conveyor Belting.

Its rugged steel construction provides for long service. The open mesh feature permits quick cleaning with steam or scalding water without removing belt from friction drum. Also allows for circulation of heat, cold, liquid or air around products in process.

Flexible feature assures tight grip of belt on friction drum—eliminating creeping, weaving and jumping. It provides a perfectly flat surface for containers, empty or filled. Made of best galvanized material obtainable. It's the most dependable and economical belt for every process and handling operation.

Write at once for literature and price—no obligation.

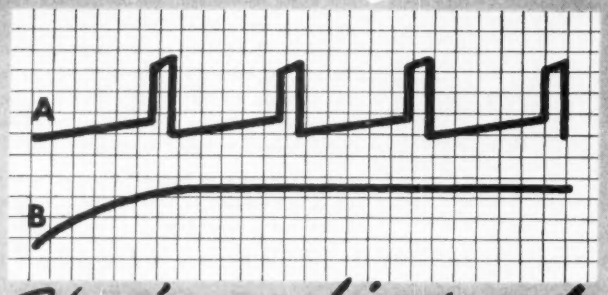
LA PORTE MAT & MFG. CO.

BOX 124 LA PORTE, INDIANA

DAY "Autoclean" DUST FILTER

WILL GIVE YOUR PLANT

Constant AIR VOLUMES

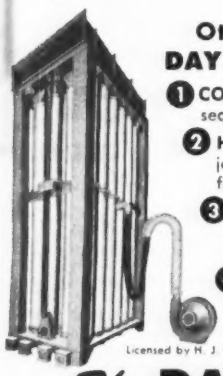


Here's graphic proof

Sharp variations in back pressure, as shown by line A, occur in most filters when sections must be shut down for cleaning because the entire air load must go through the cloth left in service. Such sharp increases in back pressure cause undesirable decreases in air volumes.

The automatic-continuous reverse air jet cleaning mechanism of the **DAY** "Autoclean" Dust Filter eliminates the need for shutting down any part of the filter for cleaning. Thus back pressures are held uniform and constant air volumes are assured.

When the **DAY** "Autoclean" Dust Filter is first started, back pressure rises slightly then levels off and remains constant as shown by line B.



Licensed by H. J. Hersey, Jr.

Other Advantages of the DAY "Autoclean" Dust Filter:

1. **CONTINUOUS-AUTOMATIC OPERATION**—Eliminates sectional shutdowns for dust filter cleaning.
2. **HIGH CLOTH CLEANING EFFICIENCY**—Reverse jet cleaning mechanism provides uniform cleaning over full length of tube.
3. **SEPARATED DUST STREAMS**—Several different product streams can be handled simultaneously *without mixing.*
4. **HIGH AIR TO CLOTH RATIOS**—10, 15 or 20 to 1 with uniform low back pressure.

*Write-to-***DAY** for new "Autoclean" Dust Filter Bulletin No. 491.

The **DAY** Company

817 3rd Avenue N. E. • Minneapolis 13, Minnesota
IN CANADA: Box 70D, Ft. William, Ont.
Branch plants in Ft. Worth, Buffalo and Welland, Ont.

percent of that produced in 1948, Mr. Henkel said. Tonnage last year was only 169,000 tons, compared to 203,700 tons in 1948.

Price Estimates

If the consumers' price index declines during the year, the downdrift in food prices will be a major factor, in the opinion of the government economists who were willing to hazard a guess.

The index stood at 168.6 at the end of November, while Food was up to 200.8. End of 1950 estimates ran as low as 163 for the overall index and 190 for Food. These year-end estimates were admittedly cloudy, however. There was more confidence in the half-year guess, which put the overall at 166.8 and Food at 195.7.

Only a relatively few of the government's economic forecasters were willing to go out on a limb for either period.

Schedule of Events

March

6–9—American Society of Bakery Engineers, 26th annual meeting; Edgewater Beach Hotel, Chicago.
6–11—State College of Washington, 19th annual institute of dairying; Pullman, Wash.
16–17—Dairy Industries Supply Assn., 31st annual meeting; Congress Hotel, Chicago.
23–24—University of Wisconsin, dairy manufacturers conference; Department of Dairy Industry, Madison, Wis.
27–29—American Dairy Assn., annual meeting; Morrison Hotel, Chicago.

April

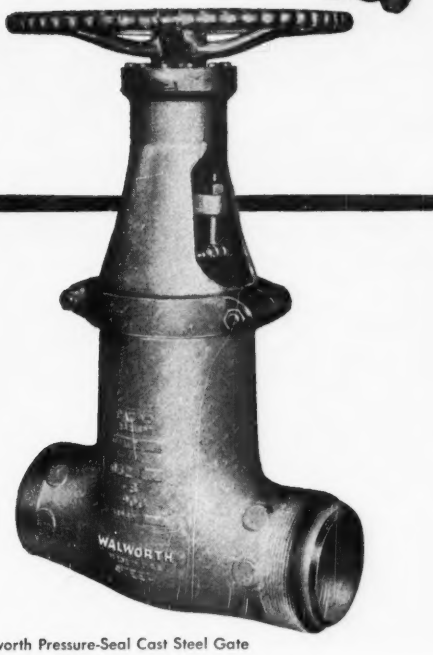
7–8—Self-Rising Flour Institute, 16th annual meeting; Buena Vista Hotel, Biloxi, Miss.
18–20—National Fisheries Institute, 5th annual convention; Edgewater Beach Hotel, Chicago.
24–27—American Management Assn., 19th national packaging exposition; Navy Pier, Chicago.

May

1–4—U. S. Brewers Foundation, 74th annual convention; Fairmont Hotel, San Francisco.
7–10—Flavoring Extract Mfg. Assn., 40th annual convention; Hotel Traymore, Atlantic City, N. J.
7–11—American Society of Brewing Chemists, annual convention; Hotel Statler, Detroit.
14–18—American Assn. of Cereal Chemists, 35th annual convention; Sheraton Hotel, Chicago.
15–17—Millers National Federation, 48th annual meeting; Edgewater Beach Hotel, Chicago.
21–25—Institute of Food Technologists, 10th annual meeting; Edgewater Beach Hotel, Chicago.

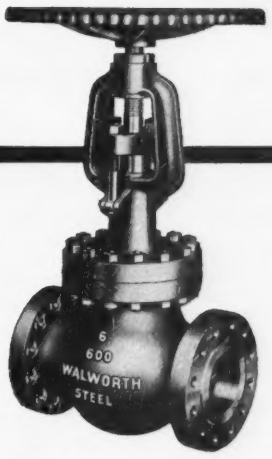
—*End*

Walworth Series 150 Cast Steel Valves are tough and wear-resistant. Gate valves are available in sizes from 2" to 24", and globe valves in sizes 2" to 12".



Walworth Pressure-Seal Cast Steel Gate Valves exemplify the greatest improvement in high-pressure, high-temperature valve design. The internal pressure keeps the body-to-bonnet joint tight. Series 600: 1½" and larger — Series 900: 3" and larger — Series 1500: 1" and larger.

Years of trouble-free service assured with . . .



Walworth Series 600 Cast Steel Valves have strength and ability to resist wear. They assure long life and positive operation. Available in either gate or globe types — Gate: sizes 1½" to 18" — Globe: sizes 2" - 8".

WALWORTH cast steel valves

Walworth Cast Steel Valves have proved their ability to assure years of trouble-free, dependable service. Accurately threaded stems, deep stuffing boxes, streamlined ports, and heavy cast alloy steel walls are their top features.

You can get full information about Walworth's complete line of steel, iron, and bronze valves and fittings from our new Catalog 47. See your nearest Walworth distributor, or write on business stationery for your free copy.

Walworth Cast Steel Fittings are manufactured in a wide range of types and sizes to meet every requirement. They are made to the highest standards of quality, both as to dimensional accuracy and metallurgical properties.

WALWORTH
valves and fittings
60 EAST 42nd STREET, NEW YORK 17, N. Y.

For cans that boost sales--
CHECK WITH CONTINENTAL

There's no doubt about it – the right package can boost the sales of a product against the keenest competition. To give you the right sales-making container, Continental supplies hundreds of different types and sizes of cans. And we are always ready to study your requirements and suggest the best package for your product.

Every Continental can is precision made to fill fast – close easily and tightly – speed up production. And you'll be pleased by the way Continental's striking lithography makes your container a point-of-sale attention-getter.

Most important to you, Continental is a service organization. We have both the research facilities to meet your technical problems and the manufacturing capacity to assure you of a dependable source of supply.

It costs nothing to talk things over. *Why not check with Continental today?*

You can't beat Continental as a dependable source of supply!

CONTINENTAL CAN COMPANY

100 East 42nd Street, New York 17, New York

Changes in Food Supplies

Stocks and Storage

STOCKS of canned foods in canners' hands on January 1, compared with '49, were reported by National Canners Association as follows:

	Actual Cases	
	1950	1949
Asparagus	725,819	483,008
Sweet Corn	24,441,761	17,514,169
Green and Wax Beans	8,605,145	4,896,892
Peas	12,132,602	14,881,047
Tomato Juice	14,601,988	16,298,870
	Basis 24/2½'s	
Peaches	11,598,000	9,484,000
Pears	2,890,000	2,458,000
Apricots	1,655,000	2,915,000
Sweet Cherries	742,000	216,000

FROZEN FISH AND SHELLFISH held in storage January 1 totaled 149,036,231 lb., as against 150,973,526 lb. held Jan. 1, 1949. Holdings a month earlier were 161,554,407 lb.

FREEZER occupancy increased 3 points during December, to stand at 76 percent on January 1. This was 4 points above the occupancy on Jan. 1, 1949. Cooler occupancy was reported 64 percent filled on January 1, a drop of 3 points since December 1, but an increase of 10 percent over the same date a year ago.

Production

MARGARINE produced during December totaled 73,321,000 lb., a sizable increase over the 69,414,000 lb. turned out during December, 1948, and the 70,065,000 lb. produced in November. Production was also 12,418,000 lb. above the 1944-48 December average.

CREAMERY BUTTER reached an estimated total of 95,875,000 lb. in December, a 13 percent gain over December, 1948, and 15 percent over the five-year average for the month. The November-December gain was 6 percent, compared with a 4 percent increase in the five-year averages. Production for 1949 totaled 1,408,605,000 lb., 16 percent more than the 1948 output and a fraction above the five-year average.

ICE CREAM turned out in December was estimated as totaling 28,910,000 gal., 7 percent less than in December, 1948, and 1 percent under the five-year December average. The November-December decline was 14 percent, compared with a 9 percent drop a year ago and 15 percent in the five-year averages. Total production for the year came to 553,705,000 gal., compared with 573,544,000 gal. in 1948 and 534,936,000 gal. for the five-year average.

AMERICAN CHEESE production in December was estimated at 53,005,000 lb., 2 percent larger than the December, 1948, production, and 19 percent above the five-year average for the month. Output for the year reached 928,075,000 lb., 9 percent more than in 1948 and 11 percent above the five-year average.

TOMATOES packed in 1949 amounted to 18,873,672 actual cases, in the estimate of the National Canners Association. Previous year's pack totaled 21,466,688 actual cases.

NONFAT DRY MILK SOLIDS in December reached a record high for the month. Totaling 58,700,000 lb., output was 17 percent above December, 1948, and 84 percent over the five-year average for the month. Of the December total, 39,600,000 lb. was spray dried and 19,100,000 lb. roller dried. Spray dried production for 1949, amounted to 607,600,000 lb., was 39 percent above 1948. Roller dried output for the year—310,360,000 lb.—was 26 percent higher than 1948.

Indexes

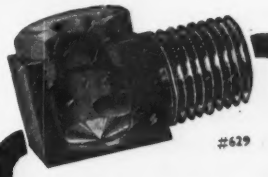
The commodity index on foods, compiled by the *New York Journal of Commerce*, rose to 173.1 for the week ending February 18, which compares with 172.0 for the previous week, 168.5 for January, and 175.1 for February, 1949.

Business Week's index of business activity stood at 192.9 for the week ending February 11. This compares with 194.6 for the previous week, 194.8 a month earlier, and 196.8 a year earlier.

CONSTRUCTION

	Pending (thousands)	Total Awarded Feb. (thousands)	Total Awarded 1950 (thousands)
Bakery	$400	$1,100	$2,596
Beverages	825	463	1,168
Canning and Preserving	.....	200	400
Cold Storage	70	.....	.....
Confectionery	.....	.....	68
Grain Mill Products	1,723	165	2,351
Ice, Manufactured	.....	.....	70
Meats and Meat Products	236	205	911
Milk Products	1,088	544	755
Miscellaneous	1,550	509	9,503
	$5,892	$3,186	$17,822

THERE'S A MONARCH NOZZLE FOR EVERY SPRAY JOB



In many Food Processing plants Monarch Spray Nozzles are used to . . . .

Wax Fruits
Rinse Vegetables
Powder Milk
Dry Eggs
Wash Filter Cake
Humidify Banana Rooms

Remember

if the liquid can be sprayed with direct pressure Monarch can furnish the Nozzles.

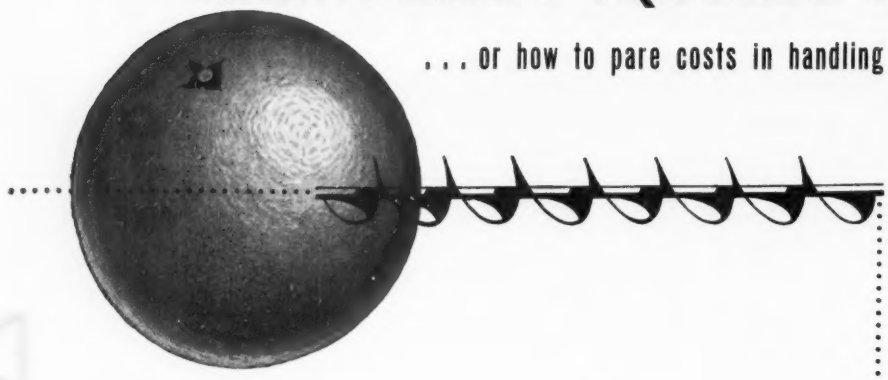
Send for Catalogs 6 A and 6 C

MONARCH MFG. WKS., INC.
2517 E. Ontario Street
Philadelphia 34, Pa.

ONE OF A SERIES DEMONSTRATING APPLIED LUKENOMICS

CALIFORNIA SQUEEZE PLAY

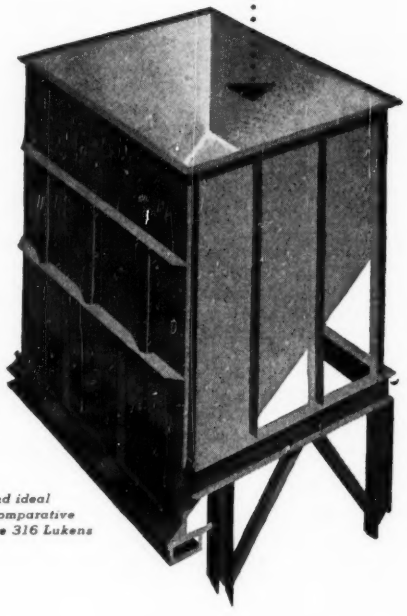
. . . or how to pare costs in handling acid waste



A large California soft drink manufacturer, through mechanization, saves hundreds of man hours yearly in citrus refuse disposal. To handle 100 tons of corrosive waste daily, they use two 25-ton, overhead, self-dumping, self-cleansing, stainless-clad steel hoppers, screw-conveyor fed. The equipment is so soundly conceived, so expertly engineered and fabricated that substantial net cash returns are also being realized.

To achieve such efficiency, they simply put Lukenomics to work. Lukenomics is the engineering art of solving the *total* problem posed in considering new equipment . . . not design alone, nor materials, nor fabrication . . . not product quality, nor operating costs, nor amortization . . . but all of these, and more, as they affect process, product, sales, profits. Lukenomics brings to bear not only Lukens own products and knowledge of materials but marshals, as well, the highly specialized skills and services of industry's most experienced engineers and equipment manufacturers.

To obtain the advantages of equipment built by fabricators applying the Lukenomics principle, write our Manager of Marketing Service, Lukens Steel Company, 401 Lukens Building, Coatesville, Pennsylvania.



To provide maximum corrosion resistance and ideal surface smoothness at the lowest cost of any comparative material, the hoppers were fabricated of type 316 Lukens Stainless-Clad Steel.

LUKENS

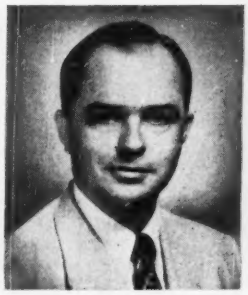
LUKENS STEEL COMPANY

BETTER PRODUCTS FOR BETTER EQUIPMENT

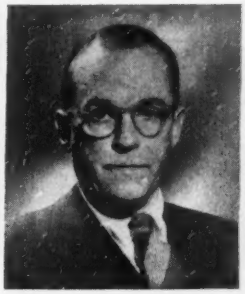
A-6351

Men, Jobs, Companies

EUGENE A. HILDRETH, manager of market development of Owens-Illinois Glass Co., Toledo, was elected president of Canning Machinery & Supplies Assn. at group's annual meeting in Atlantic City. He succeeds J. C. Whetzel, of Carnegie-Illinois Steel Corp.



WALTER S. McILHENNY becomes president of McIlhenny Co., century-old, New Iberia, La., Tabasco Sauce firm, filling vacancy created by death of his uncle, E. A. McIlhenny. He reports that last year's sales of the condiment sauce hit an all-time high.



ROBERT W. GRIGGS is new director of industrial relations with Standard Brands, Inc., N. Y. He has been with the organization since 1919, and during his career has been manager of employee relations department, advertising manager, and division salesman.

E. LLOYD DOSCH moves up from vice-president of merchandising and advertising for American Home Foods, Inc., to take the newly created post of executive vice-president. He will work very closely with Walter F. Silbersack, president of the company.

Industry

Alamaden Vineyards and **Madrone Vineyards**, two historic wineries in Santa Clara County, Calif., are reported merging. Under a joint operation program, they will function as two divisions of a single organization, which will be one of the largest in American fine-wine fields, in terms of top varietal acreage, cooperage, inventories and capitalization.

American Bakeries Co. is planning construction of a new $533,000 one-story 60,000-sq. ft. plant at Rocky Mount, N. C.

Armour and Company has opened a new branch house in Charleston, W. Va. Designed to handle 12-15 carloads of food products weekly, new unit has a complete sausage kitchen, facilities for smoking hams and bacon and preparing cooked hams, and coolers for meats and dairy products.

Bateman Frozen Foods of Macon, Ga., is building a processing plant at Lawrenceburg, Tenn., to handle strawberry crop from surrounding area.

Walter E. Bothe Foods, Inc., is new name of firm formerly known as Helen Harrison Foods, Inc., Bloomington, Ill.

Donaldson Baking Co., Columbus, Ohio, has purchased Clark Bakery of that city and is spending over $500,000 to double its size and re-equip it with modern machinery.

Durkee Famous Foods Div. of The Glidden Co., Cleveland, announces that L. Y. Pulliam has been placed in charge of company's Louisville plant and refinery. G. F. Atkinson, manager of Louisville operation since 1940, becomes executive assistant to D. P. Joyce, president of firm.

Feuchtenberger Baking Co., Williamson, W. Va., has acquired Rich-Loaf, Inc., of Portsmouth, Ohio.

Gerber Products Co. is establishing a new Canadian corporation—Gerber-Ogilvie Baby Foods, Ltd.

General Mills, Inc., has sold its 64,000-sq. ft. plant at Bloomington, Ill., to Admiral Corp., Chicago.

Hough Bakeries, Inc., Cleveland, has been granted Ohio franchise for making and selling Brownberry, a new whole wheat bread. Grain going into this bread is required to be fresh ground daily.

Hunt Foods, Inc., announces that its executive offices in Los Angeles and general sales, accounting, shipping and administrative departments in Fullerton, Calif., will be moved to company's Hayward, Calif., plant.

Igleheart Brothers, Inc., has merged with its parent company, General Foods Corp., and in future, will be known as Igleheart Brothers Division, General Foods Corp.

Hines-Park Foods, Ithaca, N. Y., is marketing an extensive line of canned foods and specialties under "Duncan Hines" label. Firm is newly incorporated with capitalization of $250,000.

Mutual Orange Distributors, Redlands, Calif., is spending more than $500,000 on new equipment to double production of quick-frozen orange juice.

Pfeiffer Brewing Co., Detroit, announces plans to increase its brewing capacity from 1,500,000 to 2,000,000 barrels yearly. New bottling units and glass lined storage and fermenting tanks are called for in expansion program.

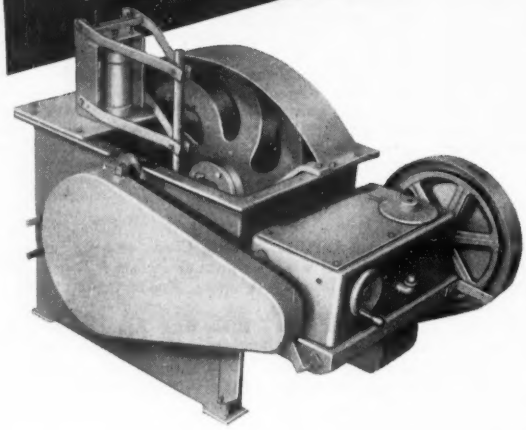
Personnel

Clinton S. Bradley is newly-appointed Chicago district sales manager of PictSweet Foods, Inc., frozen food packer of Mount Vernon, Wash. Harry M. Jones will be New York district sales manager.

R. R. Clow, formerly vice-president of Maryland Container Co., Baltimore, is now production manager for Federal Container Co., Philadelphia.

For Blending or Proportioning Food Mixes

OMEGA
ROTODIP
LIQUID FEEDER



This dependable unit meters and feeds by volume all low viscosity liquids, solutions, and suspensions by means of a unique eight-dipper feeding wheel. Feeding is continuous, variable over a 100 to 1 range, and accurate to 99% or better. There are no troublesome valves, diaphragms, pumps, or restrictive openings. Handles liquid additives such as oils, extracts, coloring, salt solutions, syrups, etc., from 1 to 800 G.P.H. Available in sanitary constructions and materials specially suited to the food industry — also multiple-dipper wheel units with capacities up to 4000 G.P.H. on special order.

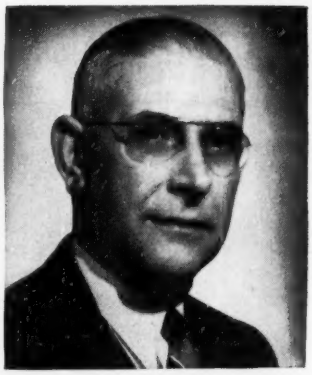
Write for Bulletin

OMEGA MACHINE COMPANY

(Division of Builders Iron Foundry)

PROVIDENCE 1, R. I.

THE LAST WORD IN FEEDERS
OMEGA



W. EARL WAINWRIGHT, president of Tri-State Packers' Assn., Easton, Md., has been named manager of California Packing Corp.'s Eastern Division. He replaces J. Oscar Hunt, who is retiring.

Both organizations are wholly-owned subsidiaries of Fibreboard Products, Inc.

Walter Desser, president of Mama Cookie Bakers, Detroit, is new president of Michigan Bakers Assn.

Dr. A. J. Haagen-Smit, professor of bio-chemistry at California Institute of Technology, is slated to receive the $1,000 Fritzsche Award at Philadelphia session of ACS meeting this April. Award is given annually for outstanding contributions in field of essential oils.

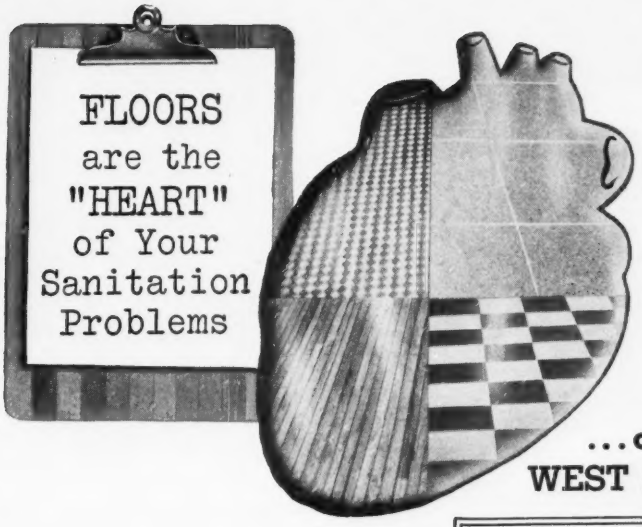
E. A. Meyer, former consultant on canned foods for WPB and administrator of Research & Marketing Act, has been appointed vice-president in charge of newly established eastern division of Richmond-Chase Co., San Jose, Calif. He will headquarter in New York City.

Ray P. Millard has joined J. Carl Dawson & Associates of St. Louis as a preventive sanitation consultant. He is a graduate of Kansas State College.

Dr. Franklin T. Peters has been assigned to newly formed development department of Glyco Products Co., Brooklyn, N. Y.

L. Y. Pulliam is now in charge of Louisville plant of Durkee Famous Foods Div. of The Glidden Co. He replaces G. F. Atkinson who becomes executive assistant to D. P. Joyce, president of firm.

Nathaniel C. Smith, former canning executive at Hoopeston, Ill., has pur-



...care for them with WEST Maintenance Products

Your floors, like the human heart, are vulnerable to the effects of neglect or indifferent treatment. To avoid shortening their "life-span" and increasing your sanitation overhead, wisely choose West floor products. Special care and treatment with West floor maintenance materials *prolongs the life* and beauty of your floors at an absolute minimum cost.

The strain on your budget is reduced because West Products, formulated for cleaning, sealing and preserving floors, are noted for their long-lasting efficiency—enabling you to protect all floors with the least time and effort.

Our trained representative will be glad to demonstrate any West product desired. No obligation!

PRODUCTS FOR THE PROMOTION OF INDUSTRIAL SANITATION

1. ZOLEO ***Cleans*** Cork, Tile, Wood, Linoleum, Marble, Terrazzo Floors and painted or varnished surfaces.	Liquid soap with Linseed Oil Base, mixes with cold water instantly. Softens dirt, loosens grease and grime with fast emulsifying action.
2. CORO-NOLEUM ***Disinfects and Deodorizes as it Cleans*** *all* floors except rubber, soft mastic, or asphalt base tile.	Phenol coefficient of 7.5. Kills the germs of many communicable diseases in addition to cleansing and eliminating the need of soap.
3. LUSTRECLEAN ***Cleans, Deodorizes and Lightly Waxes*** Wood, Mastic, Linoleum, Cement, Terrazzo, Composition Tile, Asphalt Tile, Painted and Varnished Floors.	Essentially a cleaner but leaves a fine film of wax on surface. Deodorizing properties make Lustreclean a triple purpose product. Excellent for floors, walls and painted surfaces. Removes marks left on floors by composition soles and heels of shoes.
4. KWYKWAX ***Waxes and Finishes*** all types of floors, except Terrazzo.	No rubbing or polishing necessary. Dries in 20 minutes (or less) with a high hard lustre, which resists traffic wear, protecting floor surface.
5. FLOOR MACHINES ***For cleaning and waxing floors***—shampooing and scrubbing carpets, rugs, etc.	Single and double brush models, with a complete line of accessory attachments. Low center of gravity makes for greater balance, easier handling. No oiling or adjusting necessary. Trouble-free, built-in G.E. motor.

WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.

FREE! PLEASE CLIP TO YOUR BUSINESS LETTERHEAD

WEST DISINFECTING COMPANY
42-16 West Street, Long Island City 1, N. Y.

Gentlemen:
Please send me Free samples and literature of following product numbers: 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐
Kindly have your trained representative call to arrange a free, non-obligating demonstration ☐

Name_____ Position_____
Address_____
City_____ State_____ s

THE SHELF-SHAPE
BAG THAT PACKS
WITHOUT SLACK

Deltaseal®

One reason why more manufacturers are turning to the DELTASEAL PACKAGING SYSTEM*

Deltaseal Bags are flat . . . top and bottom . . . so, they're easy to stack in attractive, space-saving displays. There's no slack-pack appearance to discourage sales. The Deltaseal closure helps the bags keep that full-pack look. Housewives like this closure, too, because the "built in" spout makes easy pouring.

Deltaseal lowers packing costs. Deltaseal Packaging Machinery is designed for Deltaseal bags alone. It fills, shapes and closes the bags fast . . . 2,000 or more an hour, depending on the commodity. Mostly automatic, it handles volume packing with real efficiency.

Let a Bemis representative explain more of the benefits in the Deltaseal Packaging System. Call or write your nearest Bemis office.

*THE DELTASEAL PACKAGING SYSTEM
Deltaseal Bags plus the Deltaseal Packaging Machinery.

BEMIS BRO BAG COMPANY

Bemis

Baltimore • Boise • Boston • Brooklyn • Buffalo • Charlotte • Chicago Cleveland • Denver • Detroit • East Pepperell • Houston • Louisville Indianapolis • Jacksonville, Fla. • Kansas City • Los Angeles • Mobile Memphis • Minneapolis • New Orleans • New York City • Norfolk Oklahoma City • Omaha • Peoria • Phoenix • Pittsburgh • Salina St. Louis • Salt Lake City • San Francisco • Vancouver, Wash. • Seattle Wichita • Wilmington, Calif.

ERNEST HART, vice-president of Food Machinery & Chemical Corp., San Jose, Calif., has been elected to board of directors. He is in charge of FMC's Niagara Chemical Division, headquartered at Middleport, N. Y.

chased canning properties, at Milford and Onarga, Ill., valued at over $2,000,000.

Samuel M. Weisberg has been named director of division of general chemistry of National Dairy Research Laboratories, Inc., Oakdale, L. I.

R. J. Warner, formerly chemist at Armour and Company, West Fargo, N. D., has been transferred to firm's production control department, Chicago.

Associated Industry

The Amana Colony refrigeration manufacturing plant, Amana, Iowa, has been sold to Howard Hall, at a reported $1,100,000.

American Air Filter Co., Inc., Louisville, Ky. and Herman Nelson Corp., Moline, Ill. have merged. The Nelson firm will henceforth be operated as the Herman Nelson Division of American Air Filter Co., Inc.

Buckeye Molding Co., Dayton, has purchased the former Radiron Corp. plant at Miamisburg, Ohio and has begun production of the firm's line of thermo plastic food containers.

Dewey & Almy Chemical Co., Cambridge, Mass., plans to open a plant in France to manufacture can sealing compounds and allied products.

Diamond Alkali Co. is putting into full-scale operation a new 50,000-ton furnace at its Cincinnati silicate plant.

Entoleter Div. of Safety Car Heating & Lighting Co., Inc., New Haven,

Good Looks

In styling that is modern and streamlined, yet rugged and distinctive, providing exceptional owner identification and advertising value.

Solid Comfort

In cabs that are tailored to drivers' needs with plenty of leg and elbow room, wide, deep adjustable seats, big windshields and windows . . . many passenger car driving conveniences.

Easy Handling

In a long list of features that include recirculating ball bearing steering, positive, easy-action, truck-built clutches and brakes, famous Syncro-Mesh transmission standard or optional on virtually every model.

Truck Engines

In seven GMC-built gasoline sizes that are basically the same as the war-famed "Army Workhorse," plus four- and six-cylinder Diesels of renowned GM 2-cycle design.

Truck Chassis

In deep, strong frames truck-engineered to support truck loads . . . heavy, husky axles, springs, transmissions, wheels and bearings, all specifically designed for long life in toughest hauling service.

GMC Gives You All These *Plus...*

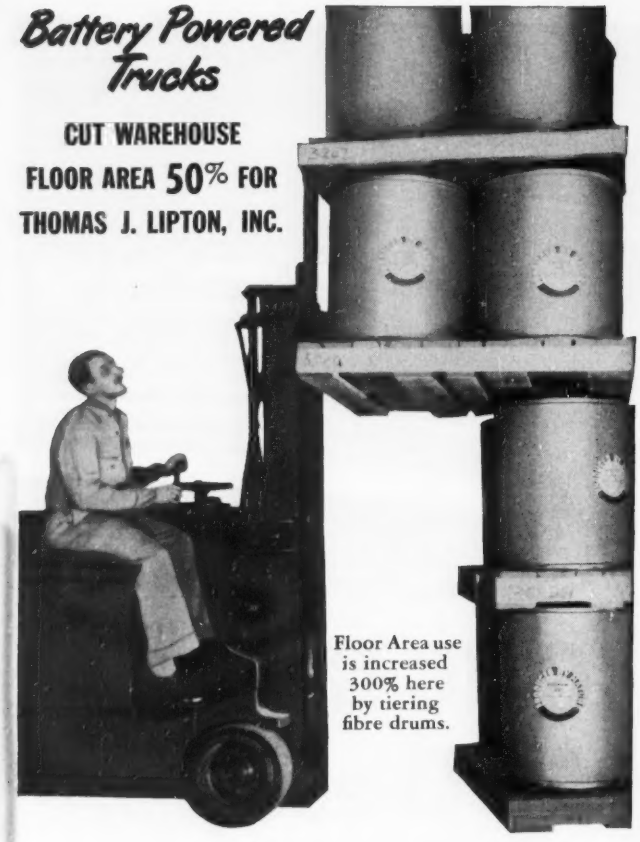
When you buy a GMC for wholesale food and meat transport, you get extra value in all the features that go to make up a truck. But beyond these, you get many plus factors. GMCs are products of the world's largest exclusive manufacturer of commercial vehicles. They are created in the industry's most modern Engineering Building . . . developed and tested, part by part, in the industry's best-equipped dynamometer laboratories. What is even more important to you as a buyer, they benefit from the renowned research and development facilities of General Motors, and the General Motors Proving Ground. If you want extra truck economy, performance, dependability and long life, it will pay you to count and consider the many extra features and qualities GMC trucks provide.

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

GMC
GASOLINE • DIESEL
TRUCKS

Battery Powered Trucks

CUT WAREHOUSE FLOOR AREA 50% FOR THOMAS J. LIPTON, INC.



Floor Area use is increased 300% here by tiering fibre drums.

FUME-FREE OPERATION IN FOOD PROCESSING

The Soup Mix Division of Thomas J. Lipton, Inc. installed a battery-powered truck and pallet system at its Hoboken N. J. plant several years ago. Here are some of the important operating advantages gained.

Warehouse floor space area was reduced by over 50% because material could be tiered and all warehousing concentrated under one roof. The company was able to install a perpetual inventory system, handle greater incoming and outgoing tonnages. Dollars tied up in materials were cut; work was speeded up; production increased.

Mr. A. E. Cuddeback, Director of Engineering and Planning at Lipton, said, "We selected battery-powered trucks to do the job because we knew they were fume-free and would have no damaging effect on raw materials or finished food products; they operate with a minimum of fire hazard; they are trouble-free... down-time for repairs is almost non-existent."

Lipton's experience is another example of electric truck *dependability* and *cleanliness* helping industry *at lowest cost per ton handled.*

THE ELECTRIC INDUSTRIAL TRUCK ASSOCIATION
3701 NORTH BROAD STREET, PHILADELPHIA 40, PENNA.

THEODORE J. GROSS, formerly managing director of Shipping Container Institute, has been retained by Union Bag & Paper Corp., N. Y. C., as technical advisor to aid in sales promotion and product development program.

Conn., announces appointment of Austin T. Drake as sales manager of Ohio, Indiana, and Michigan territory.

Hudson Equipment Co., Toledo, Ohio, has been incorporated to manufacture and deal in conveyor systems, and other automatic machinery used in food packaging.

United Board & Carton Corp., Syracuse, N. Y., has appointed C. H. Plogman as western regional sales manager, with headquarters in company's Springfield, Ohio plant.

Deaths

Edward H. Bell, 61, vice-president of American Can Co. in charge of West Coast, Alaskan, Hawaiian and British Columbia operations—Jan. 12, at his home in San Francisco, after a brief illness.

Hyym Elias Buc, 69, organic chemist and retired aide of Standard Oil Development Co., well known for his part in development of pure food laws—Jan. 21, at Roselle, N. J.

Earle J. Freeman, 54, vice-president of Kellogg Co., Battle Creek, Mich.—Jan. 26, at Ann Arbor.

Charles T. Fuchs, president of Fuchs Holsum Baking Co., South Miami, Fla.—Dec. 31, killed when struck by aircraft propeller during flying-hunting trip in Everglades.

Charles W. Griffin, 82, one of founders of California Packing Corp.—at Alameda, Calif. —*End*

PACKAGING THAT'S GOOD FOR FOOD

ZELLERBACH PAPER COMPANY, division of Crown Zellerbach Corporation, uses Plaxpak film for its home freezing kits. The value of Plaxpak film in preserving and protecting foods is being observed by masses of consumers through personal use in the home.

BRECK provides a 4-ounce Plaxpak polyethylene dispenser bottle with its regular 8-ounce size shampoo. Sales appeal of the Breck product is heightened by the convenience of an unbreakable, lightweight and squeezable container. Accidental slips won't result in a crash, or loss of contents.

COMMERCIAL POULTRY raisers find that Plaxpak polyethylene film bags as fabricated and printed by Mehl Manufacturing Co., Cincinnati, Ohio, do a real packaging and selling job. Mehl also produces packaging kits for home freezing, using Plaxpak film.

MEN, WOMEN and the kitchen are catered to in the utility kits produced by CrystalX Corp., Lenni Mills, Pa., with Plaxpak polyethylene film. From their own experience, more and more consumers are realizing that Plaxpak film is food packaging at its best.

ELECTROLYTE SOLUTION packaged separately in Plaxpak polyethylene bottles makes it possible for Koehler Manufacturing Company, Marlboro, Mass., to ship its latest Rechargeable Spotlight in a non-activated state. Purchaser receives spotlight with battery unimpaired by storage. Electrolyte is poured in when ready to use.

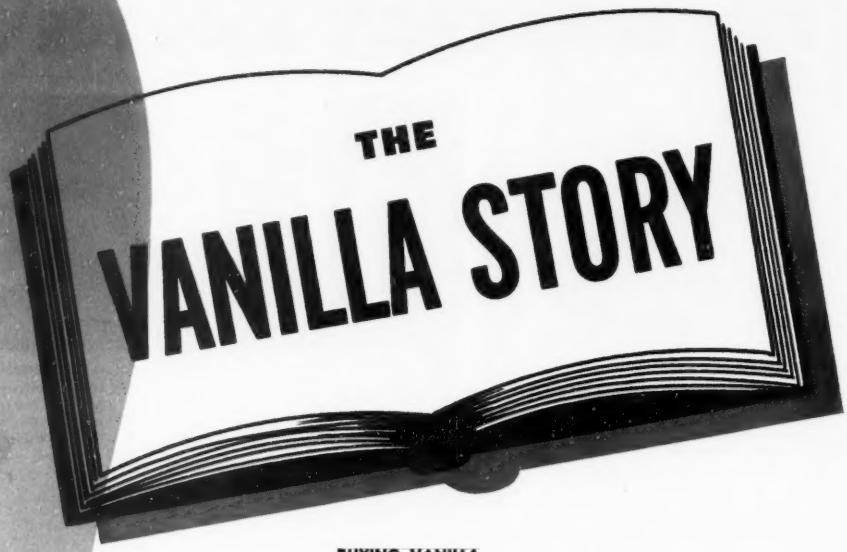
COSTS ARE SLASHED when bulk chemicals are shipped in drums or cartons with inner liners of Plaxpak polyethylene film. No leakage. Product integrity protected. Schaller Brothers, Inc., uses inner liners fabricated by U. S. Envelope Company.

★ In addition to its packaging products, Plax makes a wide variety of thermoplastics in rod, sheet, tube, and other forms.

Perishables are less perishable in Plaxpak polyethylene film. Frozen foods look their best and keep their taste in Plaxpak film. It's tough, tear-resistant, flexible and easy-to-use. Available through converters in rolls, pre-cut sheets and as finished bags, sacks, and packets. The Plaxpak polyethylene bottle is another packaging product to consider. Please write Plax for complete details on both of these packaging products.

PLAX BLOW MOLDED PRODUCTS ARE MADE UNDER THE FOLLOWING U. S. PATENTS 2128239, 2175053, 2175054, 2230188, 2230190, 2260750, 2283751, 2349176, 2349177, 2349178

PLAX CORPORATION DIVISION, HARTFORD-EMPIRE COMPANY P. O. BOX 1019, HARTFORD 1, CONNECTICUT
In Canada, Canadian Industries, Ltd., Montreal
Offices in New York City, Syracuse, Philadelphia, Chicago and St. Louis



BUYING VANILLA
IS A CONFUSING JOB AND KNOWING WHAT YOU'RE GETTING IS EVEN MORE DIFFICULT.

Here's the Reason

The finest flavor is that of an old fashioned, leisurely extract of the best Mexican or Bourbon beans. Due to yield and time required, such extracts are seldom seen in today's market. To meet practical price requirements, economies are used, such as speedier and exhaustive extractions, cheaper grades and powdered beans . . . then for further savings, the imitations, using vanillin, other aromatics and even coumarin. Each has its flavor value yet each step carries flavor farther from true vanilla. In trying any vanilla, pure or imitation, compare it to the finest pure extract. Get the best you can afford.

ALVA can supply the finest as well as every other practical grade of vanilla for every use, honestly priced and honestly labeled. Here are a few:

- Pure Vanilla Extracts, single strength, 2, 4 and 10 fold
- Oleo Resin Pure Vanillas
- Imitation Vanillas
- **ALVANYA** (imit. vanilla absolute) duplicating the aromatic portion of the bean itself. Excellent when used alone or to improve any commercial vanilla at a saving. Extreme temperature stability.
- Vanilla sugars, pure and imitation.

Tell us what you want and we will send you the best vanilla to meet your requirements.

VAN AMERINGEN-HAEBLER, INC.
521 WEST 57th STREET, NEW YORK 19, N. Y.

Alva FLAVORS

What Readers Think

Should Not Subject Glass To Full Thermal Limits

Mr. Editor:

That was an interesting article in FOOD INDUSTRIES on "How to Cut Glass-Breakage Costs" (Oct. F1). There was one matter, however, which I believe was misstated and may cause embarrassment.

At the bottom of the middle column on page 52 is a statement that "Thermal differential limits from cold to hot should not exceed 140 deg. F.; from hot to cold the limit should be 80 deg. F."

These are the practical limits, but prudence in operation dictates that we should not use these limits to the full. It has generally been our suggestion that the cold-to-hot exposure should not exceed 100 deg. F., thus giving a 40 deg. factor of safety. From hot to cold, the practical limit should be 50 deg. F., giving a 30 deg. F. factor of safety.

We compare this to an automobile. It might be capable of doing 90 miles per hour (just as the 80 deg. F. shock going from hot to cold). But we seldom use this full limit. The practical driver seldom exceeds 60 mph.—*J. H. Toulouse, Chief Engineer, Quality & Specifications Dept., Owens-Illinois Glass Co., Toledo, Ohio.*

Right Award, Wrong Firm

Mr. Editor:

A Taylor advertisement in your November issue credited the 1949 FOOD INDUSTRIES Award for achievement in food technology to the wrong company. Actually, Florida Citrus Canners Cooperative, Lake Wales, Fla., was given the Award for their processing work in frozen citrus concentrate, employing the low-temperature evaporation system supplied by Mojonnier Bros. Co., Chicago.

We regret this unintentional error and respectfully request that you publish this correction in the earliest possible issue of FOOD INDUSTRIES.—*W. W. Lockwood, Advertising Manager, Taylor Instrument Companies, Rochester, N. Y.*

How Does Mr. T. Do It?

Mr. Editor:

I've been a reader of FOOD INDUSTRIES for many years but I can't recall when I've enjoyed an article as much as "Why Not 'Go On Your Own,' Mr. T?" (Jan. FI).

I think I speak for a great many of us food technologists when I say that we dream, hope and pray to go on our own, but few of us are able to straddle that necessary evil, namely money.

By the time Mr. T. finishes his education, he is pretty well drained dry of greenbacks. Being human (some employers question this), his first goal is to marry a sweet, young and usually hungry female. He soon finds out that his burning desire of love leads to little people with big mouths.

Mr. T. soon outgrows his room-and-a-half apartment, with the result that he buys a heavily mortgaged dream house. Of course his dream house has a garage, so he buys a car with the loan company's money. And last but not least, he also acquires a mongrel or two.

Canine Upkeep

After taking care of his obligations, what is left of his income goes to the vet for the dog. Incidentally, my dog cost me more for medical treatment this past year than I've spent on myself in the last five years.

Now Mr. Poor Richard, maybe you can tell Mr. T. *how* to go into business.—*Stanley DeMisco, Pelham, N. Y.*

Editor's Comment—A fair question, but one which is so complicated by an individual's circumstances that there is no pat answer. Certainly, know-how and finances are prime requisites.

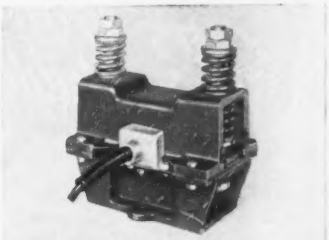
Technologists Called Meek

Mr. Editor:

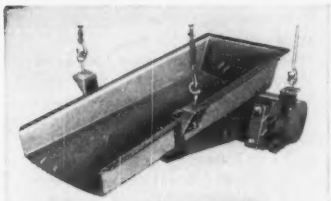
I appreciate the article headed, "Why Not 'Go On Your Own,' Mr. T?" (Jan. FI). It points out a weakness in college trained men. It will do some good. Many fellows, though, go to college *with* that weakness of

Willing and Able to Help You Reduce Costs

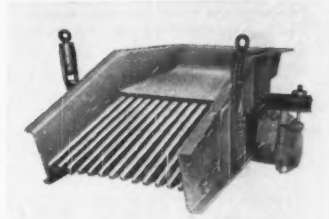
SYNTRON



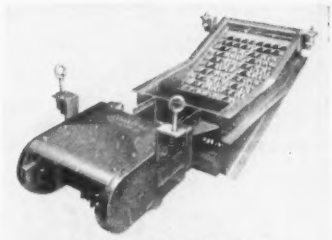
BIN VIBRATORS
Make Stubborn Materials Flow Freely



VIBRATORY FEEDERS
Up to Hundreds of Tons per Hour — Rheostat Control of Flow



VIBRATING GRIZZLIES
Both Feed and Scalp With One Unit



VIBRATING SCREENS
Wet or Dry — Single or Multiple Decks

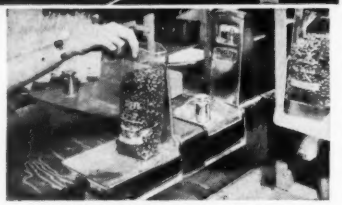
Write for literature

SYNTRON CO.
460 Lexington Homer City, Pa.

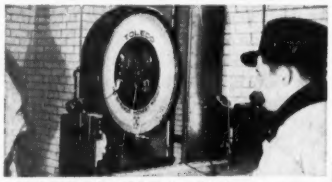
Scales today provide vital accounting data that *directly affects your costs* . . . and *profits!* That's why it's so important to *control your costs* with TOLEDO accuracy!

Your weight records originate at many points throughout your food plant—in receiving, shipping and in production departments—supplying basic information that affects your inventories, receivables, payables and the final profit figure!

Toledo has the scales to start your cost records *right*—and improve product-quality! Whether it's receiving, batching, ingredient weighing, packaging or other weighing operations . . . look to Toledo. Get Toledo-engineered accuracy, speed and dependability all the way! Send for bulletin 2020 on Modern Weight Control. Toledo Scale Company, Toledo 12, Ohio.

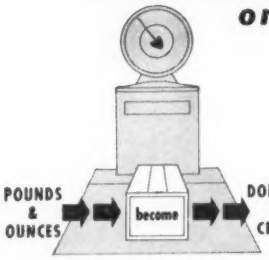


OVER-UNDER SCALES — The Speedweigh saves time in packing, filling, check weighing.



SHIPPING AND RECEIVING SCALES — Toledo Accuracy prevents small errors from multiplying into big losses!

FOOD becomes MONEY on your SCALES!



Errors made at the scale stay wrong forever. There is no chance to recheck; either the food product has been shipped or has lost its identity in the general stock. You've got to be *right* — weigh it right with Toledo!

Guard Costs with

TOLEDO *All the Way*

trying to escape economic competition, they do not just acquire it there.

For some time now, I have wanted FOOD INDUSTRIES to take a certain attitude against college-trained technologists, not razzing them but pointing out to them that they take too sissy-like an attitude toward their jobs and do not try hard enough to apply their knowledge.

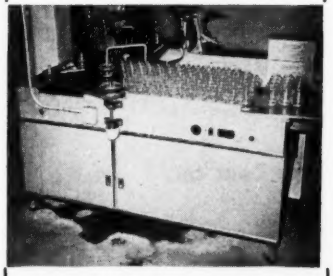
Anent Bouquets

This idea would introduce the practice of not handing any bouquets to Technology unless they were very truly earned, and in fact putting pressure on the group editorially. Yet it need not lower our profession in the eyes of Management.

It is my hope to keep Management from losing any respect for us, and such remarks would be interpreted as self-chastisement and be favorably looked-upon.—*E. H. W., Corvallis, Ore.*

Editor's Comment—The writer may have a point there. But FOOD INDUSTRIES always has followed the policy of praising food technologists as a group when they earn it—which is often—and of criticizing them constructively when the situation warrants it. —*End*

Cut Costs
with
ISLAND'S
Styl-O-Matic
UNSCRAMBLING TABLES



Its speed will amaze you. Handles bottles, jars, cans, and containers in all shapes and sizes. Easily installed . . . adaptable to any equipment. Reduces breakage . . . sanitary. Write for Bulletin F26-1A for details.

7-K-4

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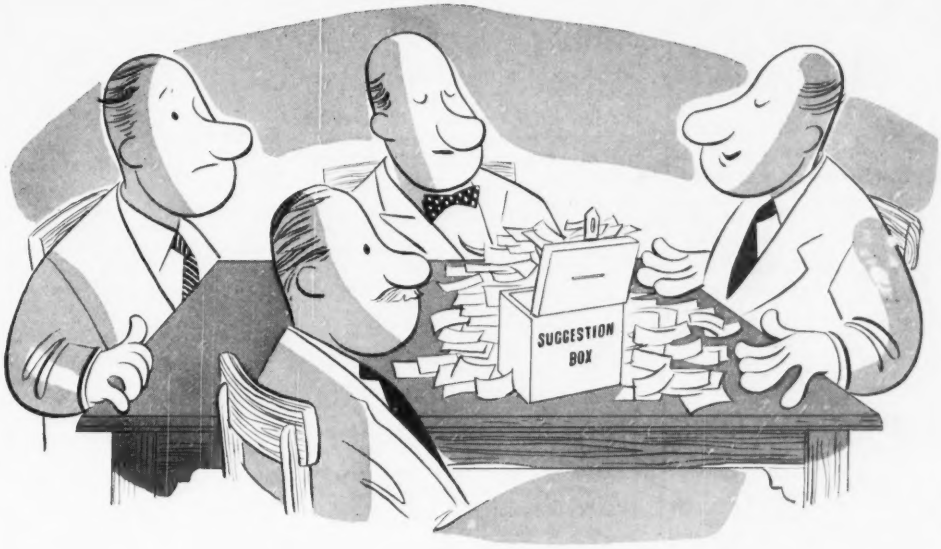

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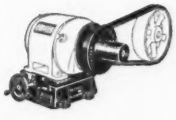
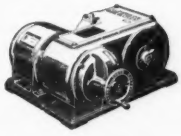
THE 3 BASIC REEVES UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

VARI-SPEED MOTOR PULLEY provides an instantly variable speed drive within 4:1 ratio for any constant speed motor. Sizes to 10 hp.



MOTODRIVE combines motor, speed varying mechanism and reduction gears in single unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 20 hp.



The benefits of REEVES Speed Control, applied to your production machines, will be immediately apparent to everyone in your organization. Management will see it in production, sales and financial reports. The man at the machine will see it in the almost effortless ease with which he turns out *more and better work.* For the right speed for every operation and every operator under every changing operating condition, install REEVES Variable Speed Drives and Controls on your present machines . . . demand them on the new machines you buy. Write for full details on the complete REEVES line. Ask for the new, 132-page Catalog No. FD25-3N.

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NATURAL B-COMPLEX PRODUCTS: Pure Primary Dry Yeast (brewers' type), Bee-Flex Products, Yeast Extracts, Yeast Extract and Liver, Fortified Yeast with Iron.

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"First For Food Fortification"

Books

Research Studies

ANNUAL REVIEW OF MICROBIOLOGY, VOL. III. *Edited by C. E. Clifton, S. Raffel and H. A. Barker. Published by Annual Reviews, Inc., Stanford, Calif.,* 1949. 476 *pages;* 6¼ x 9 *in.; cloth. Price,* $6.

This review is rather short on interest to the food technologist. Probably only one paper—"Food Microbiology" by H. O. Halvorson—holds any direct value. As an important link in the series, however, this volume will be useful to all who are engaged in any aspect of microbiological research.

Controlled Operation

PLANT PRODUCTION CONTROL, *Second Edition. By Charles A. Koepke. Published by John Wiley & Sons, Inc.,* 440 *Fourth Ave., New York* 16, *N. Y.,* 1949. 568 *pages;* 6¼ x 9¼ *in.; cloth. Price,* $5.50.

Production control personnel in the food plant will find a great deal of help in this book. It offers a broad background for the study of specific problems in production planning as they apply to the many industrial situations.

In this new edition, operating detail and mechanism have been greatly enlarged upon. There are also a large number of practical examples, which are fully discussed to give the reader a firm grasp of the various important functions involved.

Methods for purchasing and producing economic quantities of materials and products are also offered, either in tabular, formula or nomographic form.

Cheese Making

MANUAL FOR THE CHEESE INDUSTRY. *By J. C. Marquardt. Published by The Marquardt Publishing Co.,* 14 *Maxwell Ave., Geneva, N. Y.,* 1949. 91 *pages;* 4½ x 6 *in.; paper. Price,* $3.

Here is a compact, practical handbook specially prepared for cheese makers. Its pages are devoted to the manufacture of Cheddar, cottage, cream and processed cheese, cheese foods and cheese spreads. The little book also discusses milk, plant sanitation, calculations and statistics.

In all the chapters, the approach is from the working standpoint. Information on cottage cheese, for example, includes slow and fast sets, and various styles and preparation of curds for storage. The manual should be useful to dairy plant managers and sanitarians, as well as beginners.

Pumped Dry

PUMP QUESTIONS AND ANSWERS. *By Roy Carter, Igor J. Karassik and Elliott F. Wright with V. deP. Gerbereux, W. C. Mumford and Albert M. Shaw. Published by McGraw-Hill Book Co., Inc.,* 330 *W. 42nd St., New York* 18, *N. Y.,* 1949. 346 *pages;* 6¼ x 9¼ *in.; cloth. Price,* $5.

The title here leaves little room for further explanation, except to point to the imposing list of authors, who are all associated with the Worthington Pump & Machinery Corp.

There may be some questions covering construction, application, operation, installation and maintenance of pumps, or concerning trouble with centrifugal, reciprocating, regenerative, rotary and vertical turbine pumps, that are not answered here. But the probability is extremely doubtful.

Management Problems

SHARPENING SALES EFFORT THROUGH MARKET RESEARCH. 24 *pages. Price,* 50¢. ADVANCES IN SALES PROMOTION TECHNIQUES. 28 *pages. Price,* 50¢ ECONOMIC FACTORS IN MARKET PLANNING. 35 *pages. Price,* 75¢. BUYING AND ADMINISTERING CORPORATE FINANCE. 123 *pages, Price,* $3.75. *All published by American Management Assn.* 330 *W. 42nd St., New York* 18, *N. Y.,* 1949, 6 x 9 *in.; paper covered.*

These booklets can be highly recommended to those concerned with the subject matter covered by the titles.

Government Publications

FEDERAL AND STATE STANDARDS FOR THE COMPOSITION OF MILK PRODUCTS. *Bureau of Dairy Industry, BDIM-Inf-45. Mimeographed.* An elaborate tabulation of the legal requirements and administrative rulings of various jurisdictions for approximately 15 milk products.

HOW TO USE WHOLE AND NONFAT DRY MILK. *By Mary T. Swickard. U. S. Department of Agriculture. AID-86. Mimeographed.* A recipe booklet.

CUMULATIVE SUPPLEMENT II TO UNITED STATES IMPORT DUTIES (1948). *U. S. Tariff Commission. Miscellaneous Series. Mimeographed.* Brings up-to-date the list of changes that

Firmenich *Blood Orange Flavor*

The fresh, *different* flavor it gives to the finished product is putting it into more formulas all the time.

In addition, its technical properties are excellent. It is one of our high-concentration materials, the mixing ratio most frequently used being ⅛ of an ounce of flavor to 100 pounds of the product under preparation.

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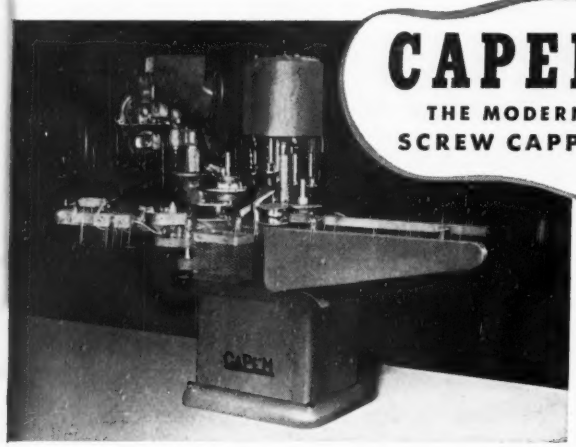

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THE MODERN SCREW CAPPER

- Applies any type of standard screw cap or cover at speeds of 2,000 to 10,000 per hour.
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- Delivers a perfect, LEAKPROOF seal at low cost.
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have been made in tariff rates for all kinds of articles since appearance of the elaborate publication giving statutory and executive status in 1948.

A Graphic Summary of World Agriculture. *By R. G. Hainsworth. U. S. Department of Agriculture Miscellaneous Publication No.* 705. *Price,* 30c. A series of maps and charts showing the relation of agricultural products to populations, and the relative implications for the food industry and food trade of the world.

Collective Bargaining Provisions—Seniority. *Bureau of Labor Statistics, Bulletin* 908-11. *Price,* 20c. Quotations from about 270 union contracts showing seniority provisions now operating in a large number of companies.

Statistics On the Uses of Specially Denatured Alcohol, Fiscal Year Ended June 30, 1949. *Bureau of Internal Revenue, Alcohol Tax Unit. Mimeographed.* Annual statistical summary.

Preservation of Agricultural Specimens in Plastics. *By G. R. Fessenden. U. S. Department of Agriculture. Miscellaneous Publication No.* 679. *Price,* 25c. Of interest to agricultural research workers.

The DDT, Toxaphene, and Chlordane Content of Milk as Affected by Feeding Alfalfa Sprayed With These Insecticides. *By R. E. Ely, et al. U. S. Department of Agriculture, BDIM-Inf-*85. *Mimeographed.*

Relation Between and Precision of Dust Counts (Light- and Dark Field) From Simultaneous Impinger, Midget-Impinger, Electric-Precipitator, and Filter-Paper Samples. *By C. E. Brown and H. H. Schrenk. Bureau of Mines, Report of Investigations* 4568. *Mimeographed.*

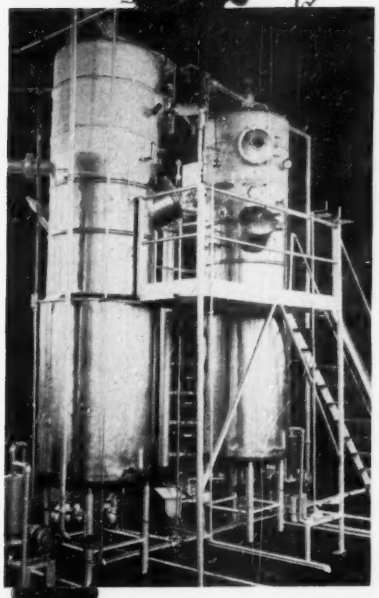
Dried Milks. *By G. E. Holm. Bureau of Dairy Industry. BDIM-Inf-*25. A descriptive memorandum.

Chololate-Flavored Milk. *By F. M. Grant. Bureau of Dairy Industry BDIM-Inf-*80. This is an information memorandum with bibiliography describing types recognized by the bureau.

The above recently issued documents are available, at the prices indicated, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. When no price is indicated the pamphlet is free and should be ordered from the bureau responsible for its issue. —End

"Vineyard fresh" flavor

for grape juice and grape jelly preserved with Stainless Steel



WHEN the Welch Grape Juice Co. began processing grape products at San Leandro, Calif., last year, they took every precaution to see that their grape juice and grape jelly retained the delicate, *natural* flavor that has made them famous. That's why preparation of these grape products is handled entirely in Stainless Steel equipment.

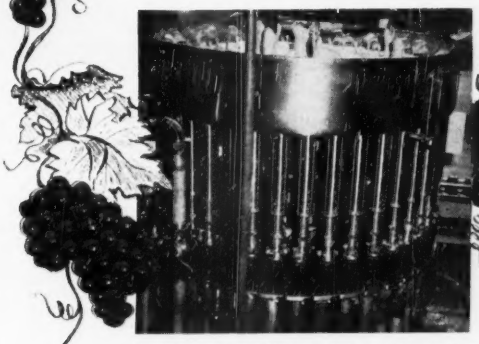
Raw grape juice is stored in Stainless Steel tanks . . . pasteurized in Stainless equipment . . . bottled in a rotary filler whose contact parts are all Stainless. In jelly production, the stock is mixed with sugar in Stainless kettles . . . cooked in Stainless vacuum vessels . . . travels through Stainless pipes . . . is packed in jars in a Stainless Steel filler.

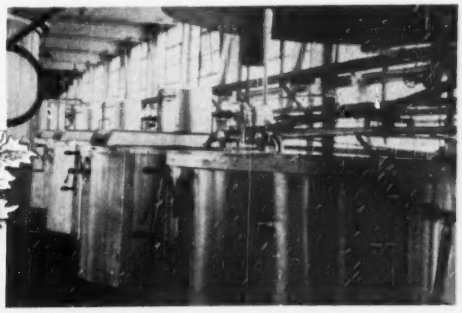
Stainless Steel equipment is the surest way to safeguard the flavor, color and purity of any type of food product. Its bright, sparkling surface is easy to clean and keep clean. And Stainless Steel's unequalled resistance to corrosion, to wear and to heat practically eliminates repairs, replacement and plant shutdowns due to equipment failures.

Stainless Steel's versatility and ease of cleaning make it possible for you to use the same equipment in processing a variety of products. For example, Welch plans to use its San Leandro equipment for processing 12 other preserve items in addition to grape products.

When you are ordering Stainless Steel processing equipment, be sure that your fabricator uses U·S·S Stainless Steel. This perfected, service-tested material is available in a complete range of forms—sheets, strip, plates, bars, wire, pipe, tubing and special sections—as well as a variety of compositions and finishes. As a result, your fabricator can use the latest designs and the most modern techniques of fabrication. It all adds up to economy and better performance for you.

FABRICATED from Stainless Steel sheet, strip, pipe and tubing, these twin vacuum pans protect volatile flavor esters while making possible economical concentration of grape products.





TANKS for storing grape juice before processing are fabricated from Stainless Steel.

HOT GRAPE JELLY is delivered to the filler through Stainless Steel tubing.

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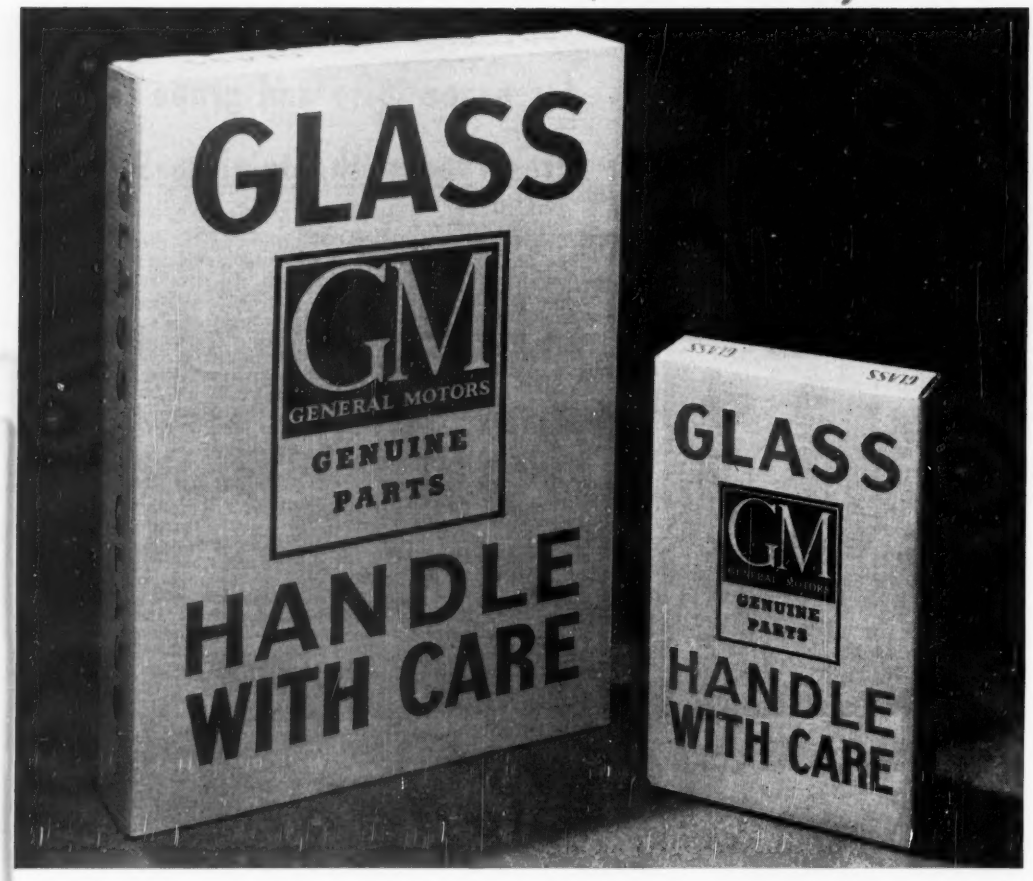

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Catalogs, Bulletins

Food Plant Equipment

All-Electric Speed Drive

The adjustable-speed operation of a machine through an economical, low hp., all-electric a.c. drive is discussed in 4-page Bulletin D-2101.—*Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10.*

Glueless Labeling Machine

A fully automatic machine that utilizes plastic coated labels and is stated to handle from 75–330 units per min. with perfect register is described in 4-page bulletin.—*New Jersey Machine Corp., 1553 Willow Ave., Hoboken, N. J.*

Traveling Hearth Ovens

Direct-fired and thermo-radiant traveling hearth ovens engineered specifically for big volume bread baking are illustrated and described in a 4-page Bulletin DM-685.—*Bakery Division, American Machine & Foundry Co., 485 Fifth Ave., N. Y. 17, N. Y.*

Specialized Machinery

A broad line of machines—such as crushers, cutters, mixers, blenders, and grain loaders—to meet the specialized needs of many different types of processing plants is featured in a condensed display of equipment in 12-page Bulletin 44.—*Sprout-Waldron & Co., Inc., Muncy, Pa.*

Atomizing Oil Burners

Where wide range of firing capacity and individual hand control of oil and air are desired, low pressure air atomizing oil burners are said to give very efficient and economical operating results. Information is given in Catalog 409.—*Hauck Manufacturing Co., 124 Tenth St., Brooklyn 15, N. Y.*

Glassware Equipment

Pyrex brand glass tubing, heat exchangers, vessels, flat glass, and other equipment useful in food processing, is featured in 8-page Bulletin EB-1.—*Corning Glass Works, Corning, N. Y.*

Direct-Fired Air Heaters

Attractively printed in colors, 6-page Bulletin 600 is designed to give understanding of direct-fired air heaters. Included are charts and cross-section drawings, together with data on typical applications.—*Peabody Engineering Corp., 580 Fifth Ave., New York 19, N. Y.*

Prefab Freezer Rooms

Flexible arrangements, special applications and advantages of a completely prefabricated sectional cold storage or freezer room, along with data on two types of refrigeration systems used, are aptly included in new 6-page foldout.—*Reco Products Division, Refrigeration Engineering Corp., 2020 Naudain St., Philadelphia 46.*

Process Unit Buying Guide

Equipment for the process industries is listed in 16-page Bulletin 25B6177C. Pumps, motors, V-belts, metal detectors, crushers, grinding mills and feeders are treated.—*Allis-Chalmers, Milwaukee 1, Wis.*

Controlled-Volume Pump

A positive displacement, controlled-volume pump having a constant-flow delivery without pulsation is described in Bulletin 649. It has application, where slug feeding may be objectionable, for metering liquids accurately in low capacities, for certain high pressure uses, in purge systems, and in pilot plant processes.—*Milton Roy Co., 1300 E. Mermaid Lane, Philadelphia 18.*

Mixing Propellers

For mixing, stirring, agitating, aerating and pumping, complete line of propellers is covered in 8-page foldout, which also contains 1950 price list.—*Michigan Wheel Co., Grand Rapids, Mich.*

Engineered Drying Equipment

Continuous conveyor drying is featured in 8-page Bulletin 342 covering problems in drying, construction features of equipment, and typical installations for particular materials.—*Proctor & Schwartz, Inc., 728 Tabor Rd., Philadelphia 20.*

Corrosion-Resistant Centrifugal Pump

A mechanical seal designed to prevent leakage of corrosive liquids is one of features of centrifugal pumps illustrated and described in 12-page Bulletin W-350-B11.—*Worthington Pump & Machinery Corp., Harrison, N. J.*

Industrial Spray Nozzles

New design of industrial spray nozzles for greater flexibility, lower maintenance costs, and better atomization is detailed in Bulletin 20.—*Binks Mfg. Co., 3122 Carroll Ave., Chicago 12.*

Materials Handling

Ball Bearings

Five distinct types of self-sealed and lubricated-for-life ball bearings designed for belt and trolley conveyors, car wheels, and similar applications, are shown in new 16-page booklet. Illustrations comprise line drawings and numerous photos of installations. Performance records are included, along with dimensional and load capacity data.—*New Departure Div., General Motors Corp., Bristol, Conn.*

Electric Lifts and Stackers

For those contemplating the use of power equipment in their materials handling operations, Bulletin 24 covers the fields of Jacklift electric trucks for horizontal movement and Master Jack Stackers for both horizontal and vertical movement of materials on skids and single or double faced pallets.—*Lewis-Shepard Products, Inc., 267 Walnut St., Watertown, Mass.*

Sleeve Bearing Speed Reducers

Engineers and designers can select parallel shaft sleeve bearing speed reducers quickly and easily by using recently released Bulletin 110. Engineering data on units is provided in handy, easy-to-read form.—*The Falk Corp., Milwaukee 8, Wis.*

Hand Chain Hoists

With enclosed steel construction, ball bearing bottom hook swivel, and improved friction mechanism, Peerless "Packet" hand chain hoists are designed to increase operating efficiency and reduce costs. Information is given in Bulletin P-5.—*The Harrington Co., 17 and Callowhill St., Philadelphia 30.*

Conveyor Line Marking

Food packers will be interested in various marking machines which automatically date,

PRACTICAL DAIRY BACTERIOLOGY

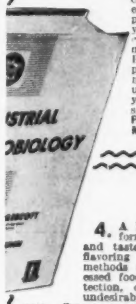
1. How the principles of bacteriology are applied in the production, processing, and distribution of dairy products. Gives a clear explanation of bacteria, yeasts and molds—their nutrition, growth, reproduction, cultivation, inhibition and destruction—and the use of modern methods for controlling them. Deals fully with market milk, butter, domestic and foreign-type cheeses, condensed milk, ice cream and other related products. **By P. Elliker, Oregon St. College, 391 pages, $4.00.**

REFRIGERATING PRINCIPLES AND PRACTICES

2. A practical guide to help you select the proper refrigerating system for your specific requirements, and to help you get more efficient service from your equipment. All common applications of refrigeration for the manufacture or preservation of comestibles are explained. Comparative advantages and disadvantages for the generally-used refrigerants are charted. **By N. Sharpe, Calif. St. Polytechnic College. 386 pages, $4.00.**

INDUSTRIAL MICROBIOLOGY

3. New, second edition packed with methods and data that ensure better investigation and control of fermentation processes. Explains laboratory and plant methods associated with yeasts, bacteria and molds, their cultivation, conditions of fermentation, end-products, etc. Presents latest information on production statistics, media and methods . . . fermentation products . . . food and fodder yeasts . . . new processes of saccharification, etc. **By S. Prescott, M.I.T., and C. Dunn, M.I.T. 923 pages, $8.50.**



FLAVOR

4. A handy source of reference information on every aspect of flavor and taste. Includes the chemistry of flavoring agents and condiments . . . methods of developing flavor in processed foods . . . methods for the detection, correction, and prevention of undesirable flavor in commercial products. Covers everything from natural sources of taste, essential oils of flavor interest and flavor changes on storage, to beverage appraisal by taste and commercial quality scoring. **By C. E. Crocker, Arthur D. Little, Inc. 172 pages, $3.50.**

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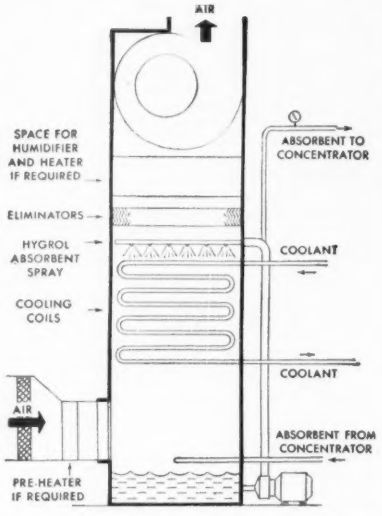
New Method Gives Precise Control in Air Conditioning

Niagara "Controlled Humidity Method" Uses Hygrol, Hygienic Liquid Absorbent

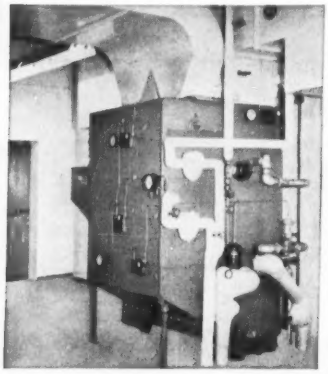


NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

● The Niagara "Controlled Humidity Method" is a new system of air conditioning giving complete control of temperature and relative humidity, holding constant conditions or varying them at the will of the user. Especially, it provides dry air at normal atmospheric temperatures with little or no refrigeration required. A condition of 15 grains of moisture per pound of air at 85 deg. F. dry bulb temperature has been produced without refrigeration.

The apparatus is enclosed in a casing thru which the air is drawn by fans. The air is filtered and then enters a chamber where it is dehumidified in passing thru a spray of "Hygrol" Liquid (a hygienic hygroscopic chemical that absorbs the air-borne moisture and contains no salts or solids to precipitate) In the same chamber are located cooling coils which remove the latent heat of evaporation and also sensible heat as required.

The absorbent liquid spray falls into a tank at the base, where it is piped to a concentrator, removing moisture taken from the air. The re-concentrated liquid returns to the system. This process is continuous, and the apparatus operates at full capacity at all times.



The same equipment may be used to provide winter air conditioning when required, by installing a tempering coil at the outdoor intake, an humidifier, and a reheat coil above the eliminators.

This equipment is manufactured in a range of sizes providing from 1000 to 20,000 CFM of conditioned air from a single unit, and mutiple unit installations are practical. It is expected that, by reducing the need for refrigeration, the cost of air conditioning will be reduced by this method. Applications generally are in a temperature range from 35 deg. F. upward. Below the freezing temperature of water, the Niagara "No-Frost" method is applicable.

The equipment is protected by U. S. and foreign patents. Installations have been made in food and chemical process industries, in packaging hygroscopic products, for preventing condensation of moisture on metals and other products in storage, in air conditioning for laboratory control and for human comfort.

For further information, write Niagara Blower Company, Dept. **FI,** 405 Lexington Ave., New York 17, N. Y.

ADVERTISEMENT

code, or mark production runs of cartons or packages—and which can be readily adapted to present conveyor lines. New 8-page leaflet illustrates and explains the equipment.—*Industrial Marking Equipment Co., 7 E. 48 St., N. Y. 17, N. Y.*

Hydraulic Oil Cylinders

A wide variety of styles and sizes of hydraulic oil cylinders featuring improved cylinder seals, multiple piping connection positions, universal mounting positions, specal self-adjusting packings, and adjustable hydraulic cushions, are displayed in Bulletin 49-55.—*Vickers Inc., Div. of Sperry Corp., 1400 Oakman Blvd., Detroit 32.*

Heavy Duty Lift Truck

Model views, action photos, and descriptive text make up Catalog 1135 covering a new 2,000-lb.-capacity lift truck announced as completely re-designed and improved.—*Hyster Co., Portland 8, Ore.*

Conveyor Belts

A 6-page folder describes 35 widths of conveyor belting, the 7 different plies, and the 6 different coatings that can be applied to adapt the belts to many uses.—*Buffalo Weaving & Belting Co., Buffalo 7, N. Y.*

Hydraulic Elevating Positioners

Three basic types of hydraulic elevating positioners are described in Bulletin 440. Several installation photos show how better positioning can simplify jobs.—*Lyon-Raymond Corp., Greene, N. Y.*

Adjustable Docks and Trucks

Operating and application features of adjustable loading trucks and docks, designed to save time, money, labor, space and breakage, are featured in 4-page folder.—*Rowe Methods, Inc., 1743 E. 25th St., Cleveland 14.*

Control Equipment

Flow Detector

Automatic monitoring of the flow of dry materials is possible with a new electronic flow detector, Signal-Flo, illustrated and described in Bulletin 108-IV. Equipment is very sensitive and can be used to indicate flow of countless dry ingredients.—*Buffalo Electronics Corp., Kenmore 17, N. Y.*

Electric Heating Mantles

Wide application of Glas-Col Heating Mantles is thoroughly discussed in new 48-page Bulletin 4. Details of construction, capacity and wattage for all size and types are listed.—*Glas-Col Apparatus Co., Inc., 1700 S. Seventh St., Terre Haute, Ind.*

Laboratory Apparatus

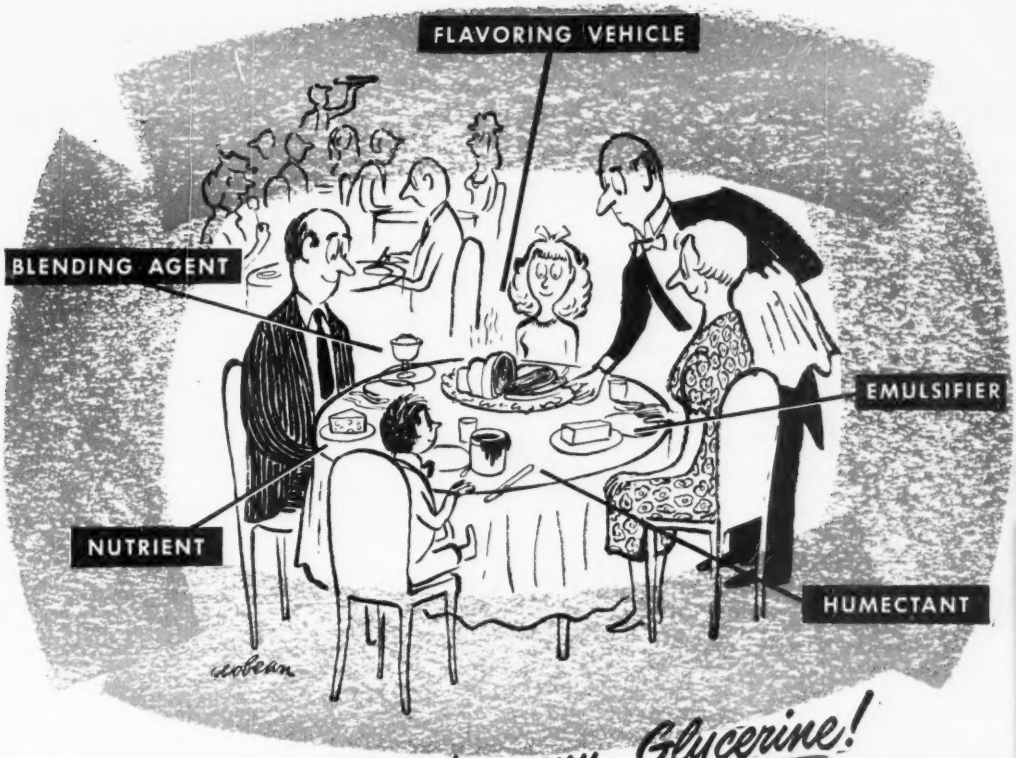
Number 9 issue of *What's New for the Laboratory*, a 12-page booklet, shows some of the most recent developments in laboratory equipment.—*Scientific Apparatus Co., Inc., Bloomfield, N. J.*

Process Measurement

In 32-page Bulletin 427 is presented a complete line of Dynalog instruments and their various auxiliary devices for process measurement and control. And in 16-page Bulletin 430, equipment for measurement and control of pH in processing operations is illustrated.—*The Foxboro Co., Foxboro, Mass.*

Level Gaging Instruments

A complete line of instruments used to indicate, measure and control liquid level and interface level is illustrated in new 24-page Catalog 75. Also described are magnetic tape-and-drum,



Always on the menu... Glycerine!

TODAY—it's hard to conceive of a menu that does not offer U.S.P. Glycerine in some shape or form! As a humectant, it maintains freshness in foodstuffs...as a sweetener, it sharpens taste and palatability . . . and as a solvent and blending agent, it assures uniform flavor for prolonged periods. U.S.P. Glycerine is actually a *wholesome, nourishing food itself*, providing energy much the same as conventional sugars and fats. Furthermore, because it is universally recognized as a *safe* ingredient, Glycerine's applications in food processing are increasing almost daily! These applications are reviewed in an informative new booklet: "*Why Glycerine for Foods?*"

TOMORROW—Glycerine will pace progress in the food industry as a component in new flavoring compounds, special preservatives, quick freezing processes, and the like. One unusual new application finds U.S.P. Glycerine as a major ingredient in a recently-patented chewing gum that is digestible—and actually nutritious—if swallowed! Glycerine functions as a softener or plasticizing agent in this permanent-chew base—details of which will be sent on request. (Please use your company letterhead.) Here again, as in countless other new developments, Glycerine proves that its unique combination of chemical and physical properties can be matched by no other product!

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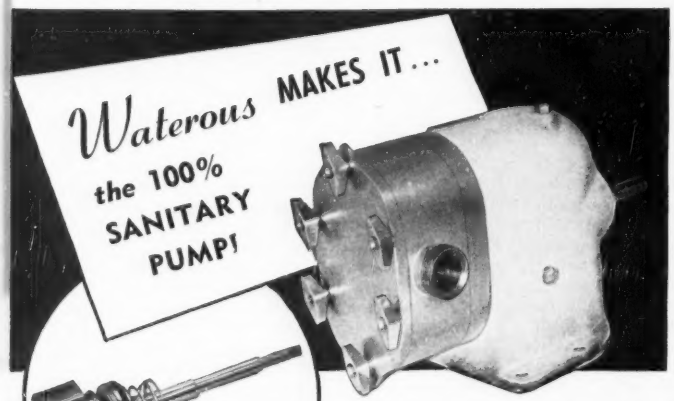

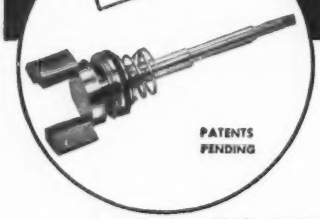

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WATEROUS COMPANY
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electronically transmitting, ball-float, pneumatic and differential pressure units.—*Fischer & Porter Co., 75 County Line Rd., Hatboro, Pa.*

Shockproof Meters

The engineering and development program for making electrical instruments "ruggedized" so that they withstand high degrees of shock is described in a 12-page pamphlet.—*Marion Electrical Instrument Co., Manchester, N. H.*

Pressure Cell

Complete specifications and description of SR-4 fluid pressure cells of eight capacities from 200-50,000 psi. are given in 2-page Bulletin 306. Also included are a wiring diagram and cross-sectional sketches of cell and seal-off unit.—*The Baldwin Locomotive Works, Testing Equipment Dept., Philadelphia 42.*

Hydraulic Pumps and Controls

Six basic units—balanced vane type and axial piston type pumps; pressure, volume and directional control valves; and hydraulic motors, together with their accessories to perform any oil hydraulic control functions—are fully illustrated and tabulated in 48-page Catalog 4800.—*Vickers Inc., 1400 Oakman Blvd., Detroit 23.*

Water Demineralizers

For mineral-free water—purified by chemical ion-exchange—use of special equipment is recommended in 20-page Catalog 123. No heat or cooling water is required. Operating cost is reported low, and machinery is stated to be easy to install and operate.—*Barnstead Still & Sterilizer Co., 2 Lanesville Terrace, Forest Hills, Boston 31.*

Plant supplies

Water Conditioning

Complete up-to-date information on the design and application of water conditioning equipment, Zeolite water softeners, water treating chemicals, water filters, taste and odor removers, and aerators is given in a 20-page Bulletin 610.—*Elgin Softener Corp., Elgin, Ill.*

Self-Adhesive Stickers

Rugged, self-adhesive tape, stickers, and labels that resist moisture, temperature changes, and abrasive action are shown in a 4-page colored promotion piece.—*Topflight Tape Co., York, Pa.*

Transmission Belting

Various types of rubber transmission belting are pictured and described, recommended uses are listed, and specifications given in new 4-page Catalog 2100. Publication also outlines in detail method of making belts endless by use of the Plylock belt joint.—*B. F. Goodrich Co., Akron, Ohio.*

Adjustable Paper Caps

Disposable, economical, adjustable paper caps with a linen-like appearance are displayed in three different styles in a 3-page folder No. 247.—*Paperlynen Co., P. O. Box 1498, Columbus 16, Ohio.*

Lamp Disposal Unit

A machine to grind fluorescent lamps to tiny pieces under water, safely, quickly and economically is shown in Catalog FL 500. Unit can dispose of 100 lamps in about 10 min. It operates on about 12 gal. of water and 110v. Less than 2 sq. ft. of floor space is occupied.—*Laduby Co., P. O. Box 1123, New Haven 5, Conn.*

Essential Oil Price List

Latest wholesale price list of essential oils, aromatic chemicals, fixatives, tinctures, oleo-

(Turn to page 171)

New Globe slicer gets long life with TIMKEN® bearings on knife shaft

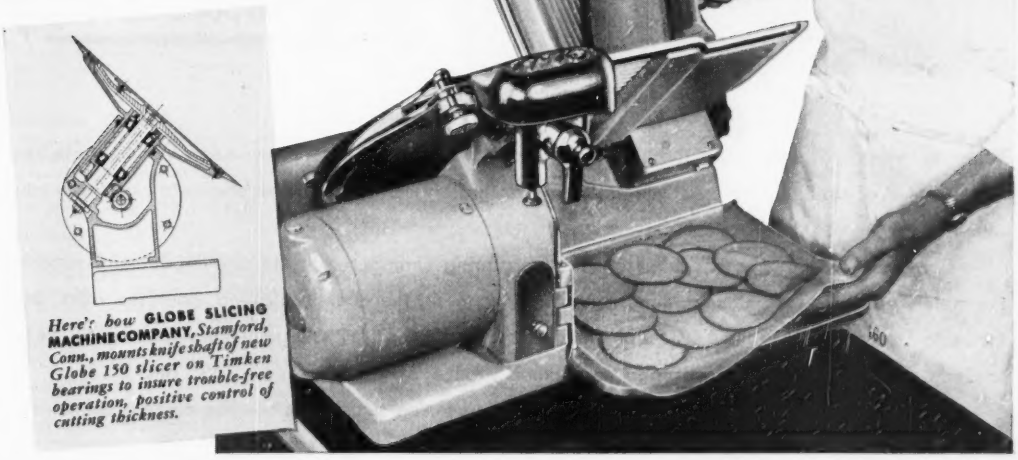
TO insure long life, trouble-free performance, and accurate control of cutting thickness, the knife shaft in the new Globe 150 slicer is mounted on Timken® tapered roller bearings.

With Timken bearings, time spent on maintenance and lubrication of the slicer is negligible. Because of their tapered roller design, Timken bearings keep moving parts in perfect alignment —permanently. They carry both radial and thrust loads in any combination. The line contact between rolls and races gives extra load-carrying capacity.

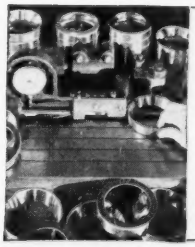
Timken bearings normally last the life of the machine. Due to their free rolling motion and incredibly smooth surface finish, friction is almost eliminated. And because Timken bearings permit effective closures, lubricant cannot leak out to contaminate foods.

On any machine, Timken bearings add a valuable sales feature. They assure greater acceptance among customers. Specify "Timken" for the new machines you buy; and always look for the trademark "Timken" on the bearings you use in the machine you build. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



Here's how **GLOBE SLICING MACHINE COMPANY,** *Stamford, Conn., mounts knife shaft of new Globe 150 slicer on Timken bearings to insure trouble-free operation, positive control of cutting thickness.*



WITHIN ONE HALF A THOUSANDTH OF AN INCH!

. . . that's an example of the accuracy demanded in the outside diameter of Timken bearing cups in order to pass inspection.

The Timken Company is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis Timken steels.

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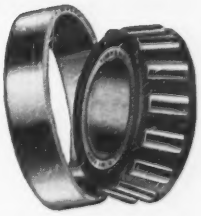
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST →◎← LOADS OR ANY COMBINATION →◎←

New AUTO-STOP METER MAKES BETTER BATCHES *Faster-*

Push the buttons to set the quantity . . .
Flip the valve open and relax . . .

THE AUTO-STOP DOES THE REST *Automatically*

Wherever syrups, liquid sugars and cold, warm or hot water are fed into processing kettles, these new Neptune Auto-Stop liquid meters save ingredients, accurately control formulas, eliminate unsanitary conditions, and provide accurate cost figures.

Combining the famous Trident disc piston measuring chamber with the new Model 432 register, the meters are ideal for batching. Simply push buttons to set the quantity desired, open the valve, and the Auto-Stop will cut off the flow automatically at the right point. Has large numerals, attractive, easy-to-clean, dirt-proof housing. Measuring Chamber is bronze. In three sizes: 1", 1½" and 2".

For more quick information about this new profit-winning meter, just use the coupon below.

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432

resins, gums, and colors is given in 12-page catalog.—*Fritzsche Brothers, Inc., Port Authority Bldg., 76 Ninth Ave., New York 11, N. Y.*

Chemical Catalog

Extensive listings of chemicals in general demand by industrial laboratories are offered in new 80-page catalog.—*E. Machlett & Son, 220 E. 23 St., N. Y. 10, N. Y.*

Paint Brush Care

How to take proper care in cleaning and wrapping paint brushes for storage is explained in house organ, *Dutch Boy Painter*, Vol. 41, No. 3, 1949.—*National Lead Co., 111 Broadway, New York 6, N. Y.*

Miscellaneous

Packaging Test Procedures

Copies of standardized test procedures for testing packaging materials, as well as finished packages and their contents, are now available. Thirty-one procedures have been adopted for paper materials. Cost to non-members is 25¢ a procedure.—*Packaging Institute, Inc., 342 Madison Ave., New York 17, N. Y.*

Laboratory Stirrer

Brookfield counter-rotating laboratory stirrer shears materials 48,000 times per min., reports industrial brochure for 11-49. This new compilation of lab equipment also contains information on photoelectric colorimeter, water demineralizer, fast analytical balances, laboratory light, and a reflection and gloss meter.—*Schaar & Co., 754 W. Lexington St., Chicago 7.*

Valves

How valves operate and how seal improves with use are among the several subjects covered in Bulletin E-160.—*Everlasting Valve Co., 49 Fisk St., Jersey City 5, N. J.*

Metallizing

Costs and ease of rebuilding old equipment with metallizing, rather than replacing it, are among topics in *Metco News*, Vol. 4, No. 11. —*Metallizing Engineering Co., Inc., 38-12 Thirtieth St., Long Island City 1, N. Y.*

Fire Pumps

Underwriter-approved centrifugal fire pumps in two basic types, also the necessary fittings, are described and illustrated in 24-page Bulletin B-1500. Included are selection charts and various application data.—*Peerless Pump Div., Food Machinery & Chemical Corp., 301 West Avenue 26, Los Angeles 31.*

Chemical Feeding

Different sizes and models of proportioning and chemical feeding pumps for processing and water and sewage treatment are detailed in 16-page Bulletin 1100.—*%Proportioneers, Inc.%, Providence 1, R. I.*

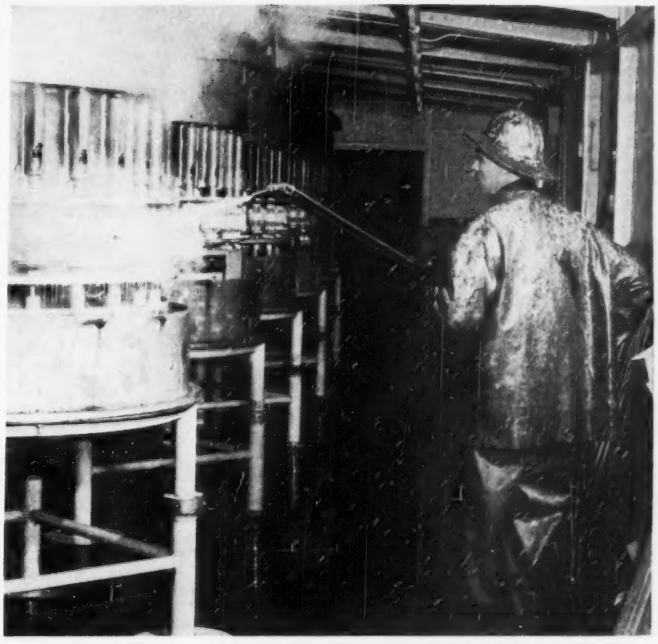
Acid-Resisting Floors

Waterproof, slip-proof, acid-resistant, and long-life qualities are reported for flooring materials described in new illustrated catalog. Varying uses of materials are detailed.—*Ralph V. Rulon, Inc., 3900 N. 2nd St., Philadelphia 40.*

Insulating Materials

Thermal conductivity and sound absorption properties of Fiberglas insulation materials is among data included in 16-page booklet.—*Owens-Corning Fiberglas Corp., Toledo 1, Ohio.*

—End



NO TWO DAYS ABOUT IT!

It often took a crew two days and more for the manual task of cleaning juice extractors like those. Now it's only a matter of minutes before soils are forced to make a quick exit, leaving equipment clean, really clean!

What makes the big difference? The potent detergency of a selected Oakite cleaning material mixed in an Oakite Steam Gun with steam heat . . . then pressure-sprayed on surfaces. That's what saves your time!

It does such a good job in so little time that you're probably thinking of it as a way of simplifying other work. Cleaning conveyor chains, for example, tables, peelers, sorters, tubs, sealers. It's a natural for all those . . . and paint stripping, too!

But Oakite Steam-Detergent Cleaning is only one of the many modern Oakite developments designed to help you get more effective, economical cleaning and sanitation. Among others are more than 80 cleaning materials to meet every soil condition, water hardness, equipment design. There are materials to remove animal fat, vegerable and fruit residues . . . take off lime scale, rust and stain. Others for odorless deodorization, bacteria control, water softening. And more.

A Free Booklet "Cleaning in the Food Industry" tells you the advantages of using Oakite cleaning materials and methods. Write for yours. Better yet phone your neighborhood Oakite Technical Service Representative and arrange to see Oakite materials actually solving your cleaning problems.

SPECIALIZED INDUSTRIAL CLEANING

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MATERIALS • METHODS • SERVICE

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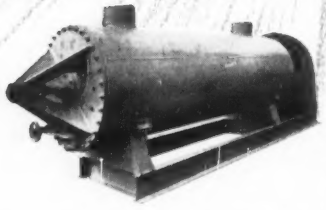
Now welded together...

The experience of the East and the developments of the West united!

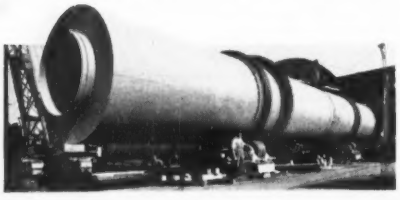
STANDARD Steel Corporation of Los Angeles announces with pride the acquisition of the Dryer Division of Hersey Manufacturing Company of Boston—the oldest dryer manufacturer in America.

The joining of these two organizations creates a fund of DRYER KNOWLEDGE unequalled anywhere. To STANDARD'S already fine dryer organization are added the engineering data and key personnel of HERSEY. The results:

- **ABILITY** to supply dryers for every industry.
- **CAPACITY** to fabricate dryers quickly—of any size—of any metal.
- **FACILITIES** to test materials—to try new designs—to manufacture all types of dryers EFFICIENTLY.
- **TALENT** to investigate, to advise, to ANSWER your dryer problems.
- **SERVICE** representatives throughout the world.



Steam jacketed horizontal dryer. Available in pressure, atmospheric or vacuum types.



Direct heat rotary dryer. One of 32 types used in chemical and food processing industries.

Write* TODAY *for the new* STANDARD-HERSEY *bulletin, describing our Continuous and Batch DRYERS, Rotary COOLERS, KILNS, and CALCINERS for the Process Industries.

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Patents

Sugar Separated From Sugar-Containing Liquids by Treating With Barium-Hydroxide to Form Mono-Barium Saccharate — *J. Hradecky, to H. Ginter and H. Manzoni, Vienna, Austria.* No. 2,488,974. Nov. 22, 1949.

Vegetable Materials Subjected to Action of Dry Steam Containing Dry Gaseous Chlorine to Produce Furfural—*E. Marchiaro, R. Mostardini and G. Orzalesi, to Bombrini Parodi-Delfino-Societa per Azioni, Rome, Italy.* No. 2,488,981. Nov. 22, 1949.

Frozen Confection Made to Consist of Cylindrical Ice Cream Plug Inserted Into Edible Pastry Shell—*F. L. Harrison, Seattle, Wash.* No. 2,489,129. Nov. 22, 1949.

Chewing Gum Base Made to Consist of Zein, Water, Glycol Ester of Maleic Modified Rosin Ester, and Plasticizer—*B. N. Lougovoy, Jackson Heights, N. Y.* No. 2,489,147. Nov. 22, 1949.

Whipping Composition Made by Pepsin Hydrolysis of Soya Protein Freed of Soluble Nitrogen Free Extract—*R. S. Burnett and J. K. Gunther, to Central Soya Co., Inc., Fort Wayne, Ind.* No. 2,489,173. Nov. 22, 1949.

Vanillin in Alkali Metal Salt Form Separated From Aqueous Alkaline Solution by Extraction With Tertiary Butyl Alcohol—*C. A. Sankey and H. B. Marshall, to The Ontario Paper Co., Ltd., Thorold, Ontario, Canada.* No. 2,489,200. Nov. 22, 1949.

Albumin-Like Soya Protein With Whipping Properties Made by Pepsin Modification of Soya Protein—*J. R. Turner to Central Soya Co., Inc., Fort Wayne, Ind.* No. 2,489,208. Nov. 22, 1949.

Plastic Mass of Corn Meal, Water-Expandible Bentonite Clay and Water Puffed to 15 Times Its Unexpanded Volume to Form Dry Friable Light Weight Porous Solid—*C. W. Chapin, H. W. Chapin and S. C. Mackabee to Allied Mills, Inc., Chicago.* No. 2,489,267. Nov. 29, 1949.

Gluten Roll Impaled in Elongated U-Section Trough and Mechanically Sliced—*H. L. Bird and A. Rose, Arlington, Calif.* No. 2,489,395. Nov. 29, 1949.

Meat Surfaces Manually Cleaned With Device Having Plastic Scraping Edge—*F. Czapar, Jr., San Diego.* No. 2,489,483. Nov. 29, 1949.

Cheese Blocks Cut Into Desired Portions by Means of Shiftable Cutting Head—*P. J. Schlude, to Essential Products Corp., Little Chute, Wis.* No. 2,489,504. Nov. 29, 1949.

Solvent Extracted Vegetable Oil Steam-Distilled Under Vacuum to Result in Decreased Splitting—*H. R. Straight, Adel, Iowa.* No. 2,489,509. Nov. 29, 1949.

Vegetable Globulin and Casein Converted Into Continuous Protein Filament—*W. A. Caldwell and E. R. Winton, Saltcoats, Scotland to Imperial Chemical Industries, Ltd.* No. 2,489,519. Nov. 29, 1949

Cottonseed, Extracted With Alcohol, Freed of Alcohol Content by Slow Current of Light Petroleum Ether Preparatory to Subsequent Extraction With Light Petroleum Ether for Recovery of Oil—*C. Trottmann, Versailles, France.* No. 2,489,599. Nov. 29, 1949.

Fruit Pitted by Rotating Knife Driven by Oscillatable Shaft—*A. Besag and O. T. Goetz, Spotswood, Victoria, Australia.* No. 2,489,612. Nov. 29, 1949.

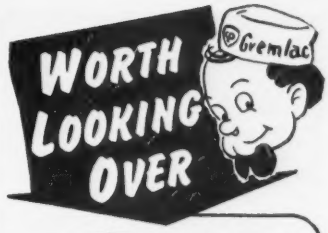
Dough Extruded From Elongated Dough-Forming Box, Cut Into Desired Portions by Manually Operated Knife—*R. E. Pennell, Chelan, Wash.* No. 2,489,667. Nov. 29, 1949.

Fats Split Into Fatty Acids and Glycerine in Presence of Water; Water Removed by Utilizing Sensible Heat of Reaction—*W. M. Leaders, to Swift & Co., Chicago, Ill.* No. 2,489,713. Nov. 29, 1949.

Fresh Fruit Prepared for Market by Treating With Aqueous Wax Emulsion Containing Decay-Inhibiting Concentration of Borax—*E. M. Brogden to Carpenter Co., Orlando, Fla.* No. 2,489,743. Nov. 29, 1949.

Amino-Acid-Containing Composition Prepared From Acid Whey—*D. B. Hand, J. G. Brereton, and O. W. Kaufmann to Sheffield Farms Co., Inc., New York City.* No. 2,489,880. Nov. 29, 1949.

Meat Treated by Cooling to Internal Temperature Between 54 and 59 F. Within 24 Hr., Subjection to Air Temperature About 68 to 70 F. With Relative Humidity of 80 to 85 Percent For About 2 Days and Exposure to Ultra-



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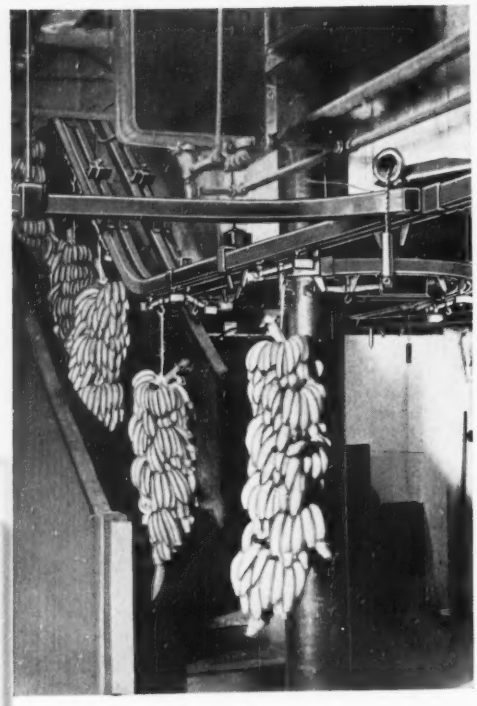

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Yes, in the food industry alone, the savings effected, when an R-W Zig-Zag Continuous Power Conveyor has been installed, amount to thousands of dollars a year.

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violet to Inhibit Growth of Bacteria and Mold —*L. J. Menges, to Westinghouse Electric Corp., East Pittsburgh. No. 2,489,918. Nov. 29, 1949.*

Milk Cooled to 40-65 F. and Subjected to Agitation of From 1200 to 3000 rpm. and Vibration Frequency Ranging From 200 to 400 Oscillations per Second for From 10 to 30 Min. to Improve Digestibility by Partially Removing Absorption Membrane Material of Fat Globules—*O. E. Carman, Vale, Ore. No. 2,490,015. Dec. 6, 1949.*

Vegetables and Fruit Peeled by Alternate Subjection to Steam Under Pressure and to Cold Water Sprays—*R. H. Winters to The Larsen Co., Green Bay, Wis. No. 2,490,112. Dec. 6, 1949.*

Grain Dried During Continuous Passage Through Tunnel Equipped With Porous Endless Conveyor Through Which Flows Heated Air in the Drying Department and Cool Air in the Cooling Compartment—*W. E. Tomlinson and B. L. Tomlinson, Hector, Minn. No. 2,490,176. Dec. 6, 1949.*

Peel-Covered Potatoes Cooked, Frozen and Thawed, Slurried in 2 Percent Salt Solution, Screened to Remove Peel, Centrifuged Dehydrated, and Ground—*J. W. Greene, R. M. Conrad and F. A. Rohrman, to Research Corp., New York City. No. 2,490,431. Dec. 6, 1949.*

Evaporated Milk Stabilized by Addition of From 8 to 60 Percent on Total Solids Basis of Base-Exchange-Treated Milk Solids Having Calcium to Phosphorus Ratio of From 0.815 to 1.155 Prior to Sterilization Treatment—*H. E. Otting, to M & R Dietetic Laboratories, Inc. No. 2,490,599. Dec. 6, 1949.*

Syrup Made From Starch by Treating Starch Conversion Liquor with Cation Exchanger Operating on Hydrogen Cycle, Then With Acid Adsorber and Finally With Cation Exchanger Operating on Hydrogen Cycle in Which Equilibrium pH of Liquor is Prevented From Falling Below About 2.4—*C. E. Smith and E. K. Olson, to A. E. Staley Mfg. Co., Decatur, Ill. No. 2,490,716. Dec. 6, 1949.*

Crude Sugar Cane Wax in Molten State Extracted With Acetone, Methyl Ethyl Ketone, Ethyl Ether, Heptane, Hexane or Pentane at Not More Than 35C. for Recovery of Hard Wax Fraction—*E. A. Wilder to S. C. Johnson & Son, Inc., Racine, Wis. No. 2,490,722. Dec. 6, 1949.*

Poultry Automatically Moved to Slaughtering Position by Device Which Swings From Substantially Horizontal Station to Substantially Vertical Position Following Insertion of Bird—*J. L. McDowell, Jr., Light Street, Pa. No. 2,490,761. Dec. 6, 1949.*

Enzyme Activity in Foods Inhibited by Treatment With Carbon Monoxide and Acetylene —*M. E. Dunklev, Modesto, Calif. No. 2,490,951. Dec. 13, 1949.*

Spaghetti and Other Foods in Continuous Stringlike Form Positioned During Rotation of Grooved Cylinders and Cut Into Desired Lengths by Vertically Reciprocating Knife—*S. F. Peterson, New London, Conn. No. 2,490,980. Dec. 13, 1949.*

Fish Mechanically Boned by Action of Revolving Disk Knives Set to Form V—*G. A. Berghammer, Jr., to Griffin's Associated Fisheries, Inc., Milwaukee, Wis. No. 2,491,078. Dec. 13, 1949.*

Viscosity of Liquids in Tank Recorded Continuously and Automatically—*A. S. Norcross,*

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Nearly 650,000 Yarway Impulse Steam Traps have already been installed—proof that they are doing a good job.

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Better in *wear*, better in *service*. Users will find Yarways require less maintenance than ever. All parts are wear-resistant, practically wear-proof. There is only one moving part, a small, stainless steel, heat-treated valve. Important, too—Yarway Impulse Traps are *suitable for all pressures up to specified maximum without change of valve or seat.*

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Waban, Mass. No. 2,491,389. Dec. 13, 1949.

Baking Quality of Flour Improved by Addition of Agent Containing Reductic Acid and Triketone Oxidation Product of Reductic Acid—*Hanns John, to Naamlooze Vennootschap Noury & van der Lande's Exploitatiemaatschappij, Deventer, Netherlands.* No. 2,491,408. Dec. 13, 1949.

Calicum Pantothenate, Thiamine Hydrochloride and Sodium Ascorbate in Oil Stabilized by Use of Glucono-delta-lactone—*C. J. Kern, Long Island City and Henry W. Del Vecchio, Brooklyn, to American Home Products Corp., New York City.* No. 2,491,452. Dec. 13, 1949.

Carotene in Carotene-Containing Plant Material With Moisture Content Between 7 and 20 Percent Stabilized During Storage by Packaging in Oxygen-Impervious Container—*E. B. Hart and A. W. Halverson, Madison, Wis. to Wisconsin Alumni Research Foundation.* No. 2,491,495. Dec. 20, 1949.

Bright Red Color of Animal Tissue Containing Myoglobin Improved by Contact With Nicotinic Acid—*H. M. Coleman and A. H. Steffen, Chicago, and E. W. Hopkins, Hinsdale, Ill., to Armour and Company, Chicago.* No. 2,491,646. Dec. 20, 1949.

Dough Baked in Traveling Band Oven Equipped With Grid Electrodes for High Frequency Heating—*J. H. Nutt, Los Angeles.* No. 2,491,687. Dec. 20, 1949.

Citrus Peel Oil Combined With 0.25 to 25 Percent Paraffin, Liquid Petroleum Oil or Castor Oil to Comprise Penetrating Oil—*H. E. Schulz, Winter Haven, Fla.* No. 2,491,774. Dec. 20, 1949.

Shrimps Fed From Hopper, Mechanically Aligned on Endless Belt, and Mechanically Beheaded by Fixed Blade Mounted Adjacent to Conveyor Belt—*W. O. Smith, Freeport, Tex., 33 percent to E. R. Bennett, Brazoria County, Tex.* No. 2,491,778. Dec. 20, 1949.

Molten Lard, and Like, Mechanically Measured and Alternately Discharged Through Nozzles Into Containers Automatically Positioned Under Nozzles by Synchronized Belt-Type Conveyor—*C. G. Meyers and B. S. Harrington to Armour and Company, Chicago.* No. 2,491,826. Dec. 20, 1949.

Sausage-Stuffed Casing Formed Into Links by Twisting Action of Cooperating Rolls—*P. A. Jacobson, Evanston, Ill.* No. 2,492,222. Dec. 27, 1949.

Fruits, Vegetables, and Like, Diced During Passage in Vertical Plane Through Plurality of Dicing Stations and Mechanically Delivered to Common Discharge Outlets—*D. W. Bingham, Brighton, Victoria, Australia.* No. 2,492,260. Dec. 27, 1949.

Meat Tenderized by Chilling to Normal Preserving Temperature, Exposing to Sterilizing Lamp in Compartment, and Circulating Air Over Lamp and Maintaining Meat Temperature at 60 Deg. F. but Below Room Temperature for Predetermined Time—*L. J. Menges, Montclair, N. J. to Westinghouse Electric Corp., East Pittsburgh.* No. 2,492,308. Dec. 27, 1949.

Fruit Juice Concentrated to Plastic Mass by Addition of Crystallizable Sugar and Evaporation to Predetermined Ratios of Crystallizable Sugar, Inert Materials and Water Which Results in Sugar Crystal Formation Upon Cooling—*J. A. Steffens, Suffern, N. Y., to The Hurd Corp., New York City.* No. 2,492,505. Dec. 27, 1949. —End

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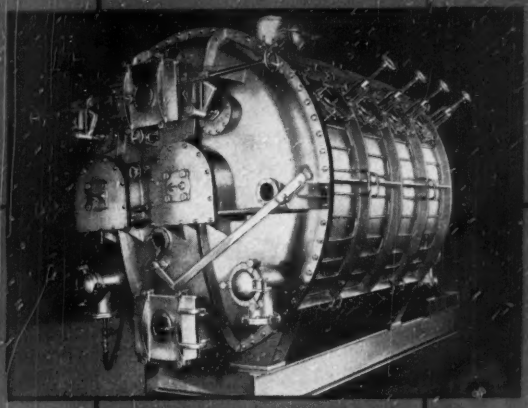
2 . . . . safely dry delicate liquid materials . . . . .

3 making better products at lower costs . . .



4 . . through new and unique features . . . . .

5 proving from actual performance that

6 DRUM DRYING BUILDS PROFITS!

1. Vacuum drying with BUFLOVAK Vacuum Double Drum Dryers is a low temperature, continuous method of producing dry materials at low operating cost.

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6. Drum Drying Builds Profits.

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Manufacturing Engineers
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121

"Package" Reefer Cooler

—Continued from page 52

placed easily and without loss of refrigerant.

In comparison with space in the regular 40-ft. overhead-cooled cars, load capacity was reduced by about 11 percent when these portable units were installed. The experimental car afforded a load area of slightly more than 1970 cu. ft. Car height was about 7 ft. But the design of the car could, if so desired, be altered to increase, somewhat, the interior height—consistent, of course, with bridge and tunnel clearance limitations.

Men Who Did the Work

Finally, a note on the men and agencies concerned with these tests: The experimentation was carried on by Principal Research Engineer O. C. Young, and his staff, of Canada's Pacific Fisheries Experimental Station. And contributing in perfecting details of the refrigerator car design was the National Research Council of Canada. On the trips, details of operation of the package units were handled by Development Engineer C. Dunn, of the U. S. Thermo Control Co. of Minneapolis, maker of the units.

For the primary information presented here, the author drew upon Mr. Young's published findings, appearing in *Progress Reports of the Pacific Coast Stations of the Fisheries Research Board of Canada, Nos.* 77, 78, *and* 79.

Photo credits: For apple shipment picture, Canadian Pacific Railway Co.; for conversion switch photo, Canadian National Film Board.

—End—

Break-Point Sanitation

—Continued from page 49

bactericidal treatment is at the sealer. As the incoming fish are carried to the sealer on a rubber belt conveyor equipped with flights, they are washed by a set of sprays that is suspended over the belt.

Second chlorine wash is given to the fish in the sealer flume (1½-ft. wide by 3-ft. long) that carries them from the conveyer into the sealer. This flume is fed with chlorinated water from a 2-in. pipe.

Third treatment is in the sealer itself. Here, a 2-in. perforated pipe sprays chlorinated water in all directions on the fish as they tumble through the rotary unit. The spray pipe is positioned in the center of the sealer and runs its entire length.

Leaving the scaler, the fish go on a rubber-belt conveyor to the cutting tables. This belt is constantly washed with treated water, which is fed by a ½-in. pipe. A second rubber-belt conveyor, that carries the fish along the filleting table to cutters, is also washed with chlorinated water.

In the cutting room, there are five outlet pipes delivering chlorinated water. Attached to these outlets are 1½-in. dia. rubber hoses to enable the porter to wash down floors and equipment.

Noticeable First Day

Four days after the in-plant chlorination system had been in operation, a 1½-in. pipe was installed around the brining-candling-packing room. Fitted 6 in. above the floor, the pipe has holes, spaced 6 in. apart. Now, after each rest period, chlorinated salt water is turned on to wash the wall-floor base line through the entire periphery of the room. At the end of the very first day, the reduction in the fishy odors was noticeable. And the workers were overwhelmingly pleased with the improvement.

Further tests have been carried out by extending pipes from the chlorinater to the fish unloading wharf, so that boats and equipment could also be washed down. High-pressure pumps (500 psi.) feed the treated water to inaccessible areas in the boats. In these experiments, the company made considerable improvement in the general sanitation of the boats, and objectionable odors and slime were reduced.

Brine Tank Treatment a Problem

Chlorination of brine in fillet-brining systems—where there is a high bacterial build-up—is not entirely satisfactory because there is difficulty in maintaining chlorine residuals at predetermined levels. This trouble is attributed to the presence of large amounts of dissolved and suspended organic material in the brine and the variable flow of fillets through the system.

For some time, the only recourse was to change the brine at frequent intervals and to control the temperature of the brine at about 35 to 38 deg. F. to help keep down bacterial counts. True, quaternary ammonium compounds have proved effective in sanitizing brining systems, but there is great difficulty in controlling the amounts added to the systems. And methods of determining the actual amounts of quaternaries in the brine are at present cumbersome.

Most recent brine-tank method investigated has been the use of ultraviolet radiation combined with filtration. But so far, Gorton-Pew has been unsuc-

for finishes

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THE HEAT TRANSFER MEDIUM
FOR HIGH TEMPERATURES

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Process men in hundreds of widely diversified industries have proved by long use the economies offered by Dowtherm—the *controlled* heat transfer medium. Operating *at low pressures* with precise uniformity over a wide range of high temperatures, Dowtherm effects vital savings in time and materials. Uniform temperatures put an end to spoiled batches, costly shutdowns and replacements . . . increase quality and production. Dowtherm assures efficiency in heat processing operations with a minimum of maintenance and operating costs.

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We don't use brass tacks in the construction of our equipment, but we're willing to get down to 'em with this proposition:

Is it worth the price of a postage stamp to find out whether or not S S & S Specific Gravity Separators and Air-Float Stoners are worthy of serious consideration in helping to solve one, or all, of these common food processing problems? The facilities of our testing laboratory (the largest non-profit operation of its type in the world) are available to you for developing these important operating data.

***But first* we would like for you to submit a small sample of your dry commodity for a preliminary survey. Upon receipt of this sample our laboratory personnel will check it against a file of case histories. If the problem is identical or similar to one we have already solved this information will be forwarded to you in detail.**

However, if no parallel data are available and our engineers recommend a test be made, it will be necessary to obtain a larger quantity of the sample. This material will then be run over S S & S equipment under actual operating conditions to develope the factual information you desire.

In either case, your initial inquiry will not deluge you with salesmen. Even though one of our regional product engineers may office nearby, he prefers to know whether or not our equipment can be of some value to you before he calls.

If you are interested in taking this basic step toward economical process and product improvement, kindly write for instructions on how to submit a small sample of your product, or use the coupon printed below.

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(Kindly print following information):

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cessful in obtaining suitable filtration units for removing suspended material from the brine solution for effective radiation.

Nevertheless, improvements are expected. So before long, one of these ways of treating brine, or a combination of them, should do the job satisfactorily. And when this time comes, it will no longer be necessary to change the brine periodically.

—End—

Oxygen Content

—Continued from page 47

vestigate the relative importance of dissolved and headspace oxygen as applied to containers of a different size. Such a case might involve a processor who packs a product containing 0.6 cc. oxygen per 100 cc. in cans containing 1 gal. liquid plus 0.1 gal. headspace (dotted line). Use of the scale marked 10, indicates that, if this much headspace were filled with air, the total oxygen content of the can would be 2.95 cc. per 100 cc. of liquid. By means of headspace purging, (dash-dot line), it would be possible to reduce this to 0.6—an improvement of 80 percent.

If the cans were filled to leave a headspace of only 2 percent, however, reference to the 2-percent axis indicates that the total oxygen content would only be 1.05 cc. per 100 cc. of liquid. In this case, headspace purging could not result in more than a 43 percent improvement. Any further reduction would require that the dissolved oxygen be removed from the liquid by a stripping technic.

Nomograph 3 may equally well be applied to containers of any other size—provided the relative headspace volume is reasonably close to one of the values shown.

Data on Different Containers

The following table, showing relative headspaces of several commonly used containers, will facilitate the use of this chart:

Container	Headspace, % Total Vol.
Can 2 in. tall	9
Can 3 in. tall	6
Can 4 in. tall	5
Can 5 in. tall	4
Can 6 in. tall	3
Qt. bottle	6
Pt. bottle	8
8-oz. bottle	6
4-oz. bottle	2–6
1-oz. bottle	10–20

In calculating the above data for cans, a headspace of 3/16 in. was assumed in all cases. This figure is thought to represent typical commercial practice. The figures for glass bottles indicate the range of head-

space over which the bottle would be acceptable as "full". It should be noticed that this range is fairly constant for all sizes given, except the smallest, for which the headspace is relatively much larger.

Because of the relatively large range over which headspace may be considered normal, it is necessary, in any given application, to judge whether the larger or the smaller value should be assumed. In many cases, adequate accuracy may be possible through simple inspection, although measurement should be made in the case of exceptionally large or small headspaces.

—End—

Equipment Corrosion

—Continued from page 83

until the desired thickness is built up. Flames 8 to 12 in. long are used, and the gun is held so that the target is approximately 2 in. from the tip of the flame. Using this technic, coatings 0.04 in. thick can be applied at the rate of approximately 16 sq. ft. per hr.

In carrying out this procedure, it will be observed that most of the particles still appear unmelted immediately upon striking the target—but that they then fuse down and lose their identity after having been deposited in place. This lag represents the time necessary for complete melting and fusion of the new material with the adjacent particles and substrate.

When working areas of 4 to 6 sq. ft., the heat applied with each pass is sufficient to maintain the target at the desired temperature level so that, once the job is started, it is not necessary to reheat.

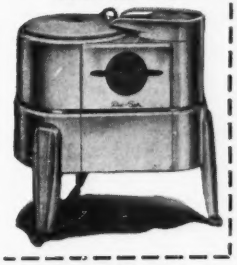
Glazed by Extra Passes

On areas smaller than 4 to 6 sq. ft., sufficient time must be allowed for fusion between coats. Larger areas, on the other hand, cannot be handled without additional heating, which is not only inconvenient but adds the danger of local overheating. Upon arriving at the desired thickness, the coating can be "glazed" or "polished" by passing the gun over it in the same manner as in spraying, but without the addition of powder.

Care must be exercised not to heat the coating so that it smokes appreciably or bursts into flame. Edges of working areas which will be bounded by additional treated areas should not be glazed and should be faired down to zero thickness over a distance of approximately 2 to 3 in. in order to allow essentially flat joints. The "pebbly" surface in this area assists

THIS LUBRICANT SAVES GEARS AND TRANSMISSIONS

—says AUTOMATIC WASHER COMPANY Newton, Iowa



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AUTOMATIC WASHER COMPANY
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SAVE with the New 'SANITOR' 171 Replacement Pump

Mounting dimensions of the new figure "171" "Sanitor" unit makes possible easy pump replacement on your present Viking sanitary units. Will fit older style flat belt drive, V-Belt drive, gear drive "Straitline" and upright base units. Remove old style pump only from unit and slip on the figure "171" "Sanitor" unit.

If desired, order the units built up in conventional mounting arrangements and drives. Available in those above mentioned. Ask for complete list of models.

Pumps furnished in 20, 35, 50 and 90 gallon per minute sizes of polished, solid Viking dairy metal, completely sanitary in every detail. A simple O-ring seal, revolvable pump for easy port change and hydraulically balanced Viking "gear-within-a-gear" principle eliminating end thrust, features this new figure "171" "Sanitor."

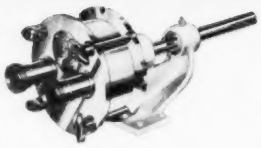

Fig. 171 "Sanitor"
ALSO AVAILABLE IN CONVENTIONAL MOUNTING ARRANGEMENTS AND DRIVES

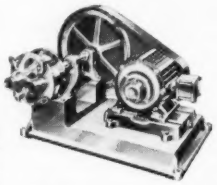

Fig. 172
V-BELT DRIVE UNIT

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In ordering replacement "Sanitor" 171 units advise model and serial number of your old equipment. Write for free bulletin E100E today. It gives you complete specifications.

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● In a Detroit pickle plant, faster production through a short season, less manual handling, lower production costs and improved product appearance resulted from installation of a conveyor system utilizing Cyclone Stainless Steel Flat Wire Metal Conveyor Belt. Pasteurizing and cooling take place automatically as the product moves along.

Perhaps one of the three types of Cyclone Metal Conveyor Belt—Flat Wire, Chain Link or Flex-Grid—can make possible faster, more efficient operations in *your* plant. For complete information, contact the nearest Cyclone sales office; they're in most principal cities. And write for Catalog No. 4 today.

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CYCLONE
METAL CONVEYOR BELTS
UNITED STATES STEEL

in securing good adhesion of subsequent coats.

Lap joints encountered between individually sprayed areas and in the repair of damaged spots can be prepared by essentially the same technic as that above. It is advisable to spray as much of a given surface as possible in a single operation so that the preheat will not be lost and can be carried from one section to another.

Protection From Preheat Flame

When it is necessary to allow the target to cool to room temperature, as at the end of a day's work or in repairing spots in completed coatings, care is necessary during subsequent preheating to avoid overheating the material already applied. Here, a portable sheet-asbestos shield has been found useful to protect the coating from the preheating flame. This shield likewise has proved useful at the edges of bare target areas adjacent to those being sprayed—that is, it protects the unpreheated surface from being spattered with stray particles from the gun.

And the particles, if numerous, can hinder adhesion of the coating in uncompleted areas by their degradation during preheating.

Making Patch Repairs

Small areas requiring patch repairs should first be stripped back to the clean metal and the surrounding coating should be roughened with a scraper to promote better mechanical adhesion to the patching deposit. Experience to date has been limited to surfaces of approximately 25 sq. ft., but there does not appear to be any reason why this technic could not be applicable to larger areas.

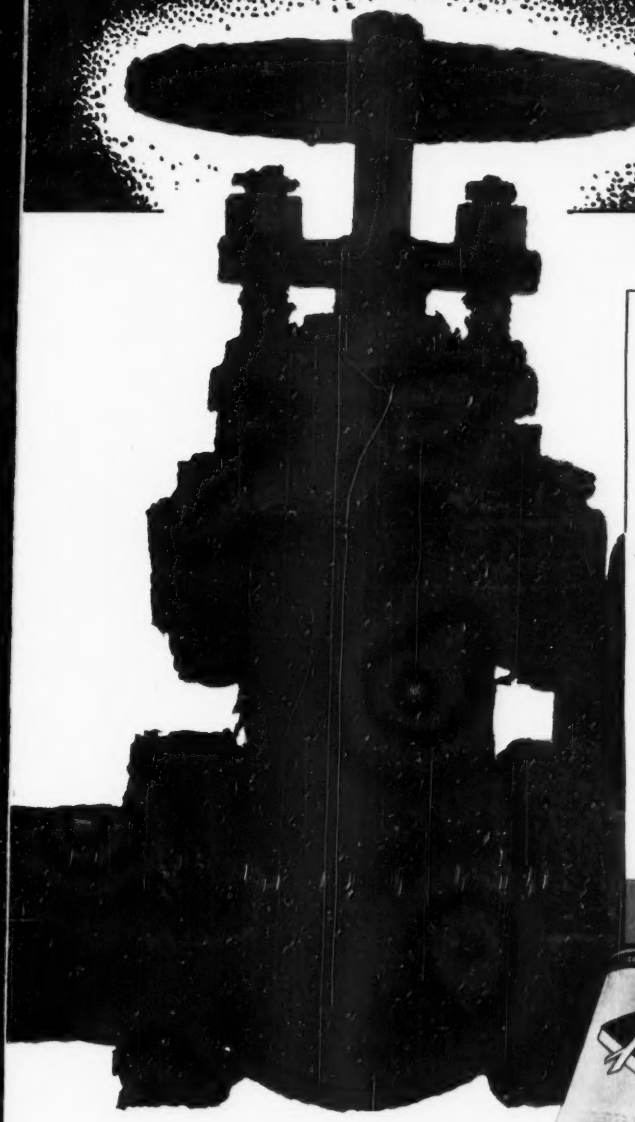
Exposure tests have shown that flame-sprayed polyethylene has essentially the same resistance to chemical attack as the molded or extruded "poly". In the tests, saucer-shaped steel vessels of approximately 8 in. dia. were lined with flame-sprayed polyethylene (vessels being employed in order to avoid difficulties of sealing the square edges of small test panels). These dishes were filled with the various reagents and the coatings were visually inspected throughout several months' exposure (see Table).

Short-Time Exposure Tests

Further tests of short duration (also recorded in Table) were carried out by exposing, in a variety of media, small strips of material prepared by the standard technic (as outlined in ASTM Des. 543-43) to characterize the resistance of flame-sprayed polyethylene to typical classes of chemical reagents.

PROTECT or PAY

You have no other choice!



Corrosion costs industry over $6,000,000,000 annually. No business escapes its effects. Attacks by acids, alkalis, salts, gases and atmospheric conditions cause untold damage that often is overlooked until too late.

Don't risk needless waste. Most conventional coatings fail when corrosion threatens. That's why Amercoat is designed to give *extra protection* against surface failure. Highly resistant to a wide variety of chemicals, brines, fumes, weathering and abrasion, it is available in a number of formulas, *each designed to meet specific conditions.*

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...and all other areas exposed to agents of corrosion or contamination.

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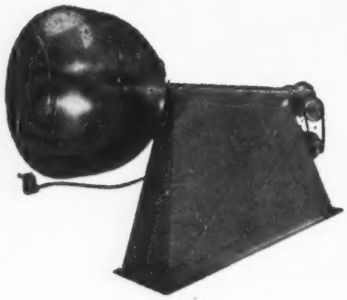

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HEADQUARTERS FOR BUSINESS INFORMATION

McGRAW-HILL publications

Practical Quality Control

—*Continued from page* 81

ature of juice and product. All of these factors should be carefully controlled from the operating standards, and periodic checking will determine if the personnel are adhering to the instructions.

H. Closing. Control factors here are the sealing operation, temperature of product and juice, headspace and, most of all, the codes. Information on the year, day, line, and quality of product being packed should be given by the codes. The technologist must check to see that the code is changed with each grade passing through the sealer, and that the counting machine is properly adjusted so that he will have an accurate and complete record of each lot. Sealing temperature is very important, since this will indicate the vacuum and, in turn, the spoilage or keeping quality of the product.

I. Cookers. Time and temperature of the process are major factors, and they must be carefully regulated. The ideal here is to have recording controllers which give a continuous record of the come-up time and temperature, the hold-time and temperature, and the cool-time and temperature, if cooled within the same equipment. In any case, the technologist should continually record the center temperature of the product as a double check on the cookers and on the instruments.

J. Coolers. Temperature of water, time in coolers, chlorination and agitation of the water must be evaluated periodically. If the product is air cooled, the time requirements before casing to prevent stackburn must be determined.

K. Warehousing and Labeling. The technologist must set up the label to be used on each lot, based on the grade from the samples he has taken from the line and the finished product. In addition, he checks the labeling, casing, stenciling, and the actual location of every lot in the warehouse. It is essential that he know the latter, and accordingly keep the different grades separated to prevent mix-ups at shipping time.

L. Sampling and Grading. In order to know the quality being packed, he should draw line samples periodically throughout the day, and check them for the retention of original raw product's quality, and also for efficiency of the entire operation. These samples will tell him at all times what is being done throughout the lines, and whether or not the operating personnel are doing the job as

Put a Double Guard on UNIFORMITY

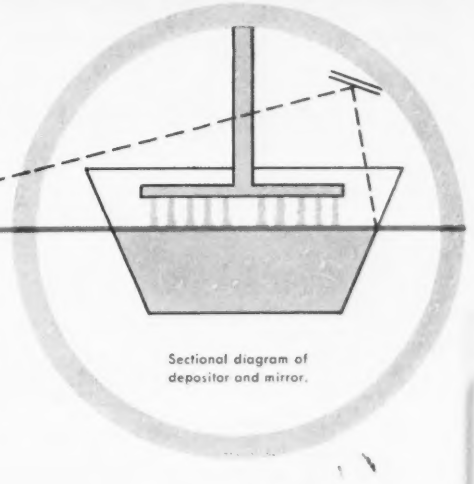
Continuous automatic mixing in the AMF Oakes Mixer guards the uniformity of your mixes *two* ways. First is the uniformity of the batter produced on the revolutionary Oakes principle. Second is the *maintenance* of that uniformity by keeping

THE EVEN BATTER LINE

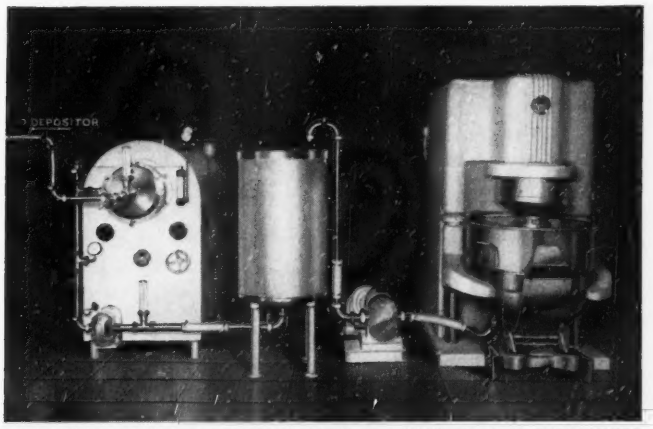
in the depositor

The AMF Oakes Continuous Mixer is equipped with a single foot control by which your operator regulates the flow of batter to the depositor between 500 and 4,000 lbs. per hour according to the capacity of your ovens.

With the aid of a mirror he can ALWAYS KEEP AN EVEN BATTER LINE in the depositor . . never too high, never too low, a practical impossibility with batch mixing.



Sectional diagram of depositor and mirror.



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The EVEN BATTER LINE assures steady, non-varying pressure on the batter at the bottom of the depositor, doubling the guard on the uniformity of your cakes.

By the unique mixing principle of the Oakes, ingredients are mixed more thoroughly in less time, producing a more desirable mix of better quality. The continuous mixing action of the Oakes produces cells of smaller size and uniform structure, increasing the stability of the mix to a point impossible in previous conventional mixers. There is no variation because human errors present in batch mixing are eliminated. The process is *continuous*, insuring the closest approach to absolute uniformity known to the industry.

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5. Big Production
6. Quick Changeover
7. Variable Capacity
8. Little Attention Required
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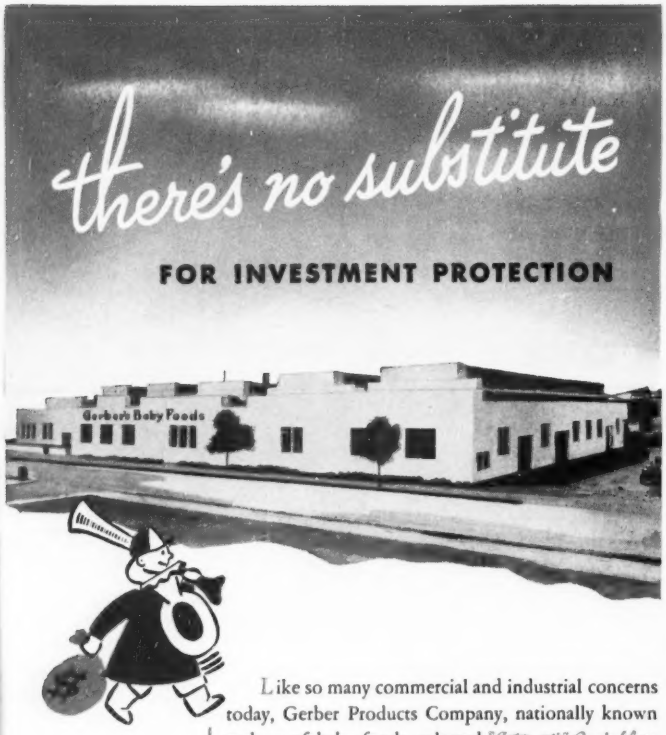

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This particular illustration is not unusual, for depending upon the risk, insurance savings of upward to 90% may be realized through the installation of "Automatic" Sprinkler protection. It's good reason why thousands of business executives throughout the country specify multi-value fire protection with "Automatic" Sprinklers, *an important investment today . . . perhaps welcomed protection tomorrow.*

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set-up in the packing procedures and standards.

In addition to the line samples, he must draw samples from each lot and grade them carefully to evaluate all the factors as previously illustrated. Quality control work sheets should be completed at every inspection tour to give a complete history of the daily pack.

In addition to these many factors, the quality control technologist must evaluate sanitary conditions throughout the entire plant and surrounding areas. He must be thoroughly familiar with water and sewage analyses, detergents, and cleaning methods.

Fig. 3 shows the type of worksheet he should use in checking each piece of equipment—before starting the operation in the morning, at each lunch period, and between shifts. He should evaluate their condition as satisfactory or unsatisfactory, with the reason given when they are unsatisfactory, and the method noted that should be used to put the machine back into a satisfactory condition. Sanitary checking may be his biggest problem and certainly should require his attention, in the smaller plants, at least.

In conclusion, the routine and periodic evaluations are only indices of the quality levels of the products being packed. The success of any quality control program is dependent on the endorsement of top management. If top management is not 100 percent behind the quality control technologist, his efforts may never materialize.

Acknowledgment

The author has drawn freely from the following references in the preparation of this article:

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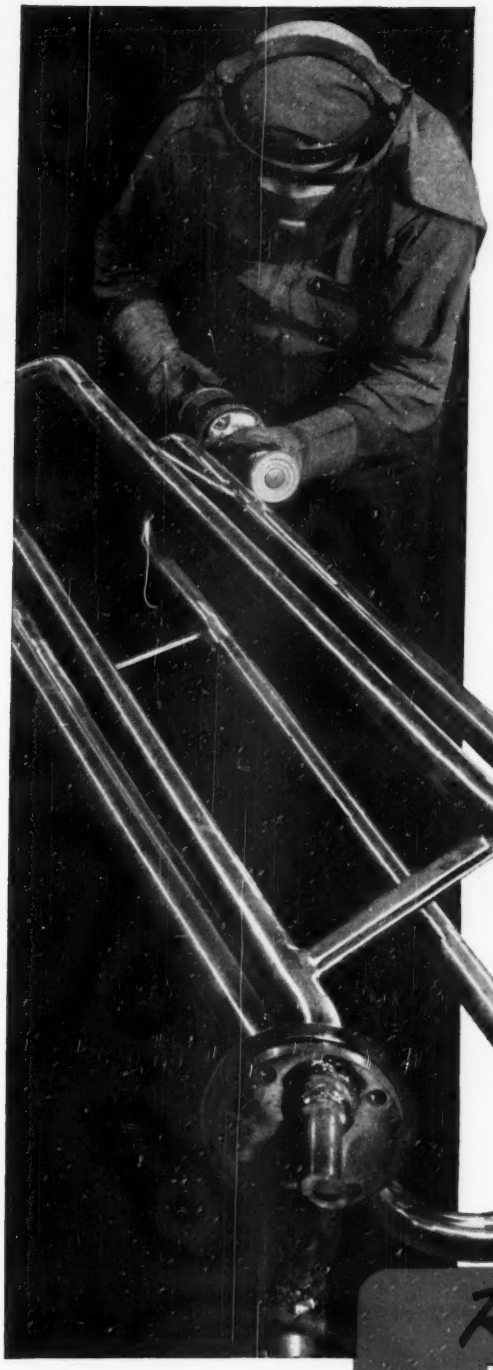

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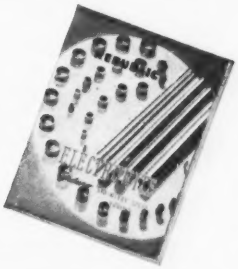

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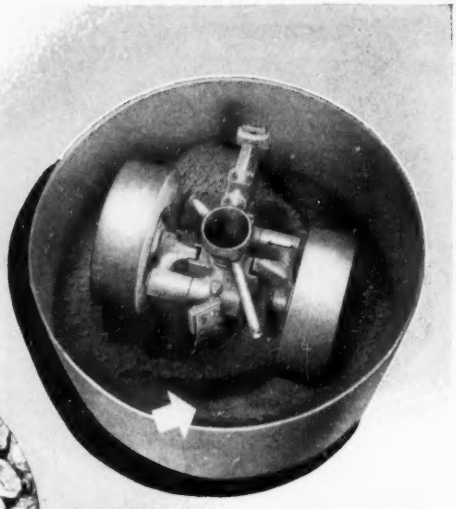

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The two photomicrographs at the left show a simple mixture of sand, clay and water. The problem here called for uniting and coating sand grains with a film of clay (similar to many material blending problems). The lower sample was mixed in a paddle mixer—note the smear of unmixed clay. The upper sample was *mulled* in a Simpson—note the uniform coating and equal distribution of all grains.

Let a National Engineer show you how to solve your mixing problems . . . better, faster, at less cost . . . by *mulling* in a Simpson *Mix-Muller. Write for full details.**

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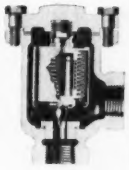
A THERMOSTATIC



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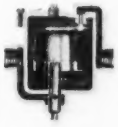

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Dry Cans	B	B
Flat Work Ironers	C	B
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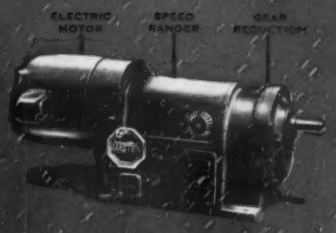

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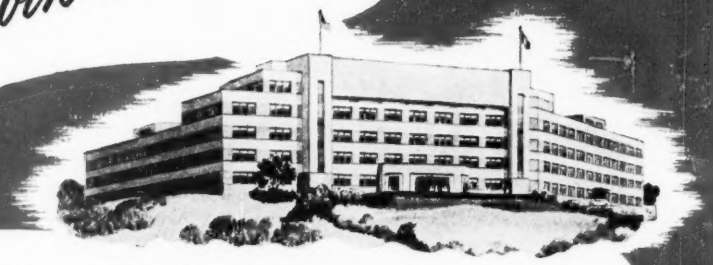
SERVING
Sterwin Chemicals INC.



Sterling-Winthrop Research Institute

RENSSELAER, N. Y.

Located next to the giant Winthrop-Stearns plant at Rensselaer, N. Y., is the beautiful new home of the Sterling-Winthrop Research Institute. This impressive structure is among the largest and most modern laboratories of its kind in the country.

STERWIN PRODUCTS RESEARCH

A large staff of scientists, using the most modern scientific equipment and methods, is continually striving, as a part of the Institute's broad research program, to improve existing Sterwin products and to develop new products and methods to aid the food industry in the production of better, more nutritious foods.

Here are some of the outstanding products developed by the research facilities behind Sterwin Chemicals:

B-E-T-S® —the *original* Bread-Enrichment Tablets, containing vitamins and Ferrous Sulfate, the highly assimilable form of Iron as an exclusive feature.

VEXTRAM® —the *original*, stable mixture containing vitamins and food iron for the enrichment of flour and other cereal products.

OXYLITE® —a highly efficient and economical flour bleaching agent.

ROCCAL® —the *original* quaternary ammonium germicide for better food plant sanitation.

ZIMCO® —brand of Lignin Vanillin C.P. U.S.P. A finer Vanillin of utmost purity and exquisite aroma.

PARAKEET brand of Certified Food Colors.

Sterwin Chemicals INC.
Subsidiary of Sterling Drug Inc.
170 VARICK STREET, NEW YORK 13, N. Y.

For information, consult your Sterwin Technically Trained Representative, or write to Sterwin Chemicals Inc., 170 Varick St., New York 13, N. Y.

Distributor of the products formerly sold by Special Markets-Industrial Division of Winthrop-Stearns Inc., and Vanillin Division of General Drug Co.
Branch Offices: Atlanta, Boston, Buffalo, Chicago, Dallas, Kansas City (Mo.), Los Angeles, Minneapolis, Portland (Ore.), St. Louis

There's Nothing Like NYTRON

TRADEMARK REG. U.S. PAT. OFF.

(The Completely Different Type of Synthetic Organic Detergent)

For Food Plant Cleaning

. . . FOR EQUIPMENT CLEANING

. . . FOR FRUIT AND VEGETABLE WASHING

. . . FOR FLOOR AND WALL CLEANING

Cleans walls, floors, painted surfaces (but does not remove paint or affect tinned and plated surfaces)

Washes tile and glassware without spotting or streaking

Completely removes oils, fats, greases

Lowers cost of cleaning operations because less is required to do a thorough cleaning job

Rinses thoroughly and quickly—in cool or even cold water

Leaves no film or deposit to harbor bacteria

Works equally well in hard or soft water. Even in the hardest water, NYTRON leaves no cloudiness, no streaks, no spots.

Never affects normal skin (is extremely mild and non-toxic)

NYTRON *CLEANS BETTER BECAUSE it has an exclusive combination of properties —a combination available in no other synthetic organic detergent . . .*

A SOLVAY PRODUCT

Samples of NYTRON—as well as detailed information and technical data on its uses in the food industry—are available on request. Get all the facts . . . see for yourself how NYTRON can help your business operate more efficiently, more profitably. Mail the coupon today.

NYTRON Improves Cleaning Action of Alkalies and Acids

USE NYTRON WITH CAUSTIC
for Fruit Peeling
Bottle Washing
Other Special Cleaning Jobs

USE NYTRON WITH ACID
for Tile Cleaning
Removing Milkstone, Lime Scale
Other Special Cleaning Jobs

SOLVAY SALES DIVISION, Allied Chemical & Dye Corporation
40 Rector St., New York 6, N. Y.

I want to know more about NYTRON, the entirely new type (patented) SYNTHETIC ORGANIC DETERGENT, and its uses in the food field. Please send me free samples plus detailed non-technical information and specific technical data.

*Name*_____

*Title*_____

*Company*_____

*Address*_____

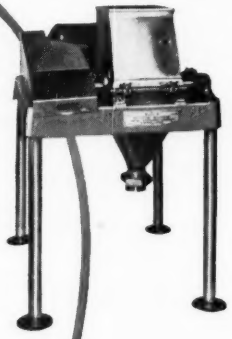
*City*_____ *Zone No.*_____ *State*_____

fmc CREAMCORN Preparation Equipment

..offers an alternate method for producing Quality CREAM STYLE CORN

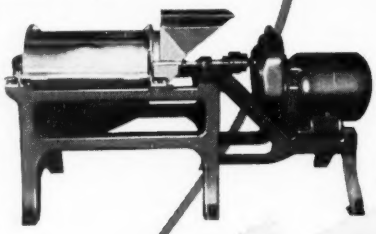
Supplementing FMC's extensive line of cream style and whole grain corn preparation and processing equipment, FMC "Creamcorn" preparation line permits the use of whole kernels in producing a quality controlled cream style corn of normal texture, appearance and flavor. This valuable equipment, thoroughly tested and proved through FMC's research and experience, offers corn packers a line-up that is easily and profitably adapted to existing plant processes and arrangements. Essentially, FMC "Creamcorn" Preparation Equipment provides for: (1) Cutting corn in whole kernels, (2) cleaning each of these whole kernels, and (3) reducing them to cream style corn according to canner's individual requirements. Employing the FMC "Creamcorn" line allows continuous washing and inspection techniques generally used for whole grain to be applied to cream style corn, thereby assuring an end product of highest purity and quality.

Highlighted here are whole kernel slitting and pulping machines—essential equipment items in the new FMC "Creamcorn" line.



Fitzpatrick SLITTING MACHINE

Performs outstanding service in providing the proper "kernel character" to FMC's "Creamcorn." Serrated, stainless steel knives, cutting against a neoprene feed roller, slit corn kernels into clean-cut pieces of desired sizes.



fmc SUPER PULPER

Thoroughly masticates the slit kernels to form cream portion of the product. Kernels are mashed against and forced through sanitary, stainless steel screens, specially selected according to desired product specifications. Kernel pulp is discharged with or without skins as desired.

Fitzpatrick COMMINUTING MACHINE

Performs a function similar to that of the FMC Super Pulper. Built of all-stainless materials, its high-speed impact blades reduce slit kernels to a cream by a combination action of impact and mashing. Sanitary, easily accessible for cleaning.

OTHER FMC "CREAMCORN" PREPARATION EQUIPMENT INCLUDES:

Corn huskers and cutters, washing equipment, picking and inspection tables, batch and blending mixers, consistency controller, filling machines, and sterilizing equipment.

Write today!

Get full details on FMC "Creamcorn" Preparation Equipment today. Bulletin No. SS50-1, now available, fully describes this important FMC development. Write, or contact your nearest FMC representative.

First in Diversified Food Equipment

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

FOOD MACHINERY AND CHEMICAL CORPORATION

Canning Machinery Divisions

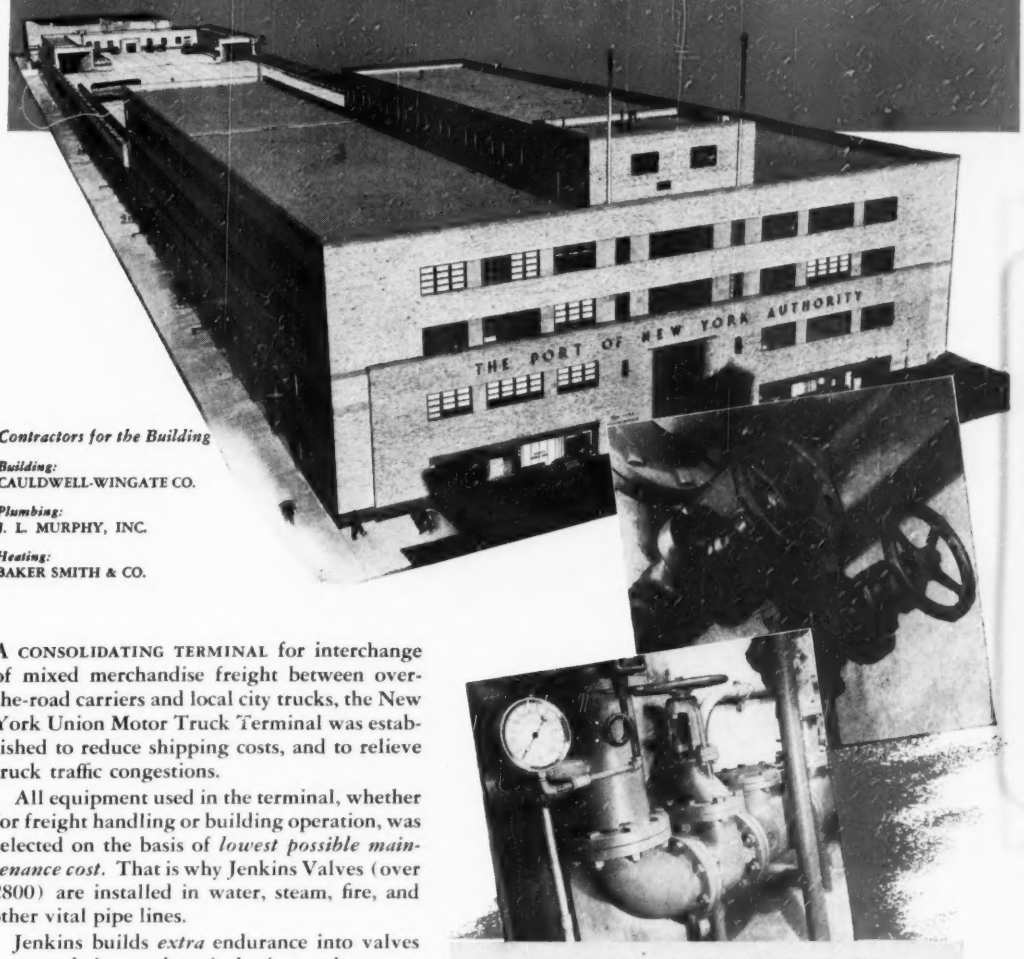
General Sales Offices:

EASTERN: HOOPESTON, ILLINOIS **WESTERN:** SAN JOSE 5, CALIFORNIA

JENKINS VALVES *installed in*

New York Union Motor Truck Terminal

for lowest maintenance cost



Contractors for the Building

Building:
CAULDWELL-WINGATE CO.

Plumbing:
J. L. MURPHY, INC.

Heating:
BAKER SMITH & CO.

A CONSOLIDATING TERMINAL for interchange of mixed merchandise freight between over-the-road carriers and local city trucks, the New York Union Motor Truck Terminal was established to reduce shipping costs, and to relieve truck traffic congestions.

All equipment used in the terminal, whether for freight handling or building operation, was selected on the basis of *lowest possible maintenance cost.* That is why Jenkins Valves (over 2800) are installed in water, steam, fire, and other vital pipe lines.

Jenkins builds *extra* endurance into valves —proved time and again by low upkeep cost records in every type of service. Yet, *you pay no more* for Jenkins Valves, despite this extra value. Let the Jenkins Diamond be your guide to valve economy . . . for new installations, for all replacements. *Sold through leading Industrial Distributors everywhere.*

Jenkins Bros., 80 White St., New York 13;
Jenkins Bros., Ltd., Montreal

JENKINS VALVES

LOOK FOR THE DIAMOND MARK

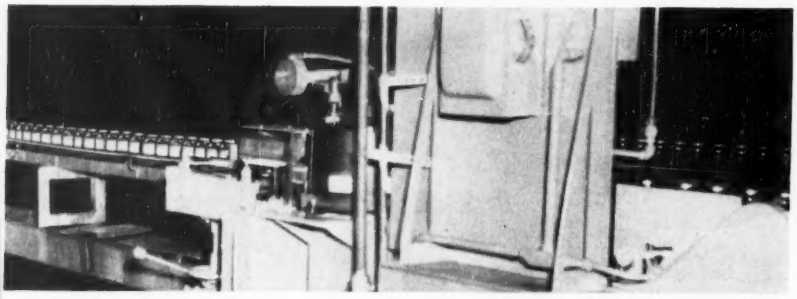
SINCE 1864 TRADE JENKINS MARK

Jenkins Bros

For Mount Olive Pickle Co., Inc....

PERVENAC* LABELING

Gives Both!



400% Increase in Labeling Speeds Here!

Mr. I. F. Witherington, Secretary-Treasurer of Mount Olive states: "We are pleased to advise of the results obtained from using Heat Seal labeling. We were using five semi-automatic label machines, each running about sixty labels a minute. Since we installed an automatic label machine using labels printed on Pervenac Paper, this one machine is doing the work of five and doing a much better job. We are now running 300 labels a minute."

Eye-Appeal that Builds Sales Here!

Pervenac labels give Mount Olive and many other packers a big "bonus" at the point-of-sale in labels that won't smear, won't wrinkle, won't tear at the edges, won't be positioned irregularly, won't drop off. In these days of self-service your label has to sell *overtime.* Pervenac will *work* for you on glass (curved or flat, wet or dry), paper, metal or film. Write Nashua or your nearest Pervenac distributor — today.

NASHUA
MAKES PAPER MAKE MONEY FOR YOU

* TRADE MARK
Manufactured under patent 2,462,029

NASHUA GUMMED AND COATED PAPER COMPANY
NASHUA, NEW HAMPSHIRE

DISTRIBUTORS

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ALBUQUERQUE, N. M.
Carpenter Paper Company
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Whitaker Paper Company
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Carpenter Paper Company
BALTIMORE, MD.
Whitaker Paper Company
BILLINGS, MONT.
Carpenter Paper Company
BOSTON, MASS.
Carter, Rice & Company
John Carter & Company, Inc.
BUFFALO, N. Y.
The Alling & Cory Company
BUTTE, MONT.
Carpenter Paper Company
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Dwight Brothers Paper Company
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CINCINNATI, OHIO
Whitaker Paper Company
COLUMBIA, S. C.
Epes Fitzgerald Paper Co., Inc.
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Carpenter Paper Company
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The John Leslie Paper Company
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Carpenter Paper Company
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Carpenter Paper Company
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D. L. Ward Company
PITTSBURGH, PA.
Whitaker Paper Company
PORTLAND, ORE.
West Coast Paper Company
PROVIDENCE, R. I.
Carter, Rice & Company
PUEBLO, COLO.
Carpenter Paper Company
RALEIGH, N. C.
Epes Fitzgerald Paper Co., Inc.
RICHMOND, VA.
Epes Fitzgerald Paper Co., Inc.
ROCHESTER, N. Y.
The Alling & Cory Company
ST. LOUIS, MO.
Acme Paper Company
ST. PAUL, MINN.
Carpenter Paper Company
The John Leslie Paper Company
SALT LAKE CITY, UTAH
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Carpenter Paper Company
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The John Leslie Paper Company
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Bulkley, Dunton & Company
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Carpenter Paper Company
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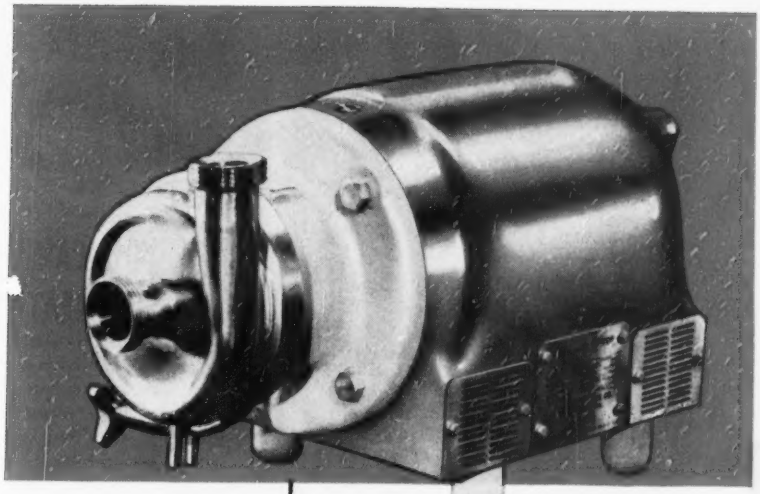
American Paper Exports, Inc., New York City
UNITED KINGDOM, EUROPE, NO. AFRICA and the NEAR EAST
I. J. Szper, 65 Ave. Niel, Paris



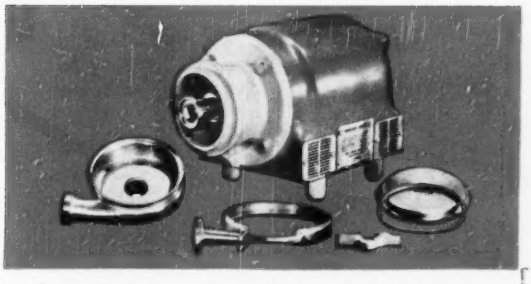
Look at the New FlexFlo Sanitary Pump

Flexflo pumps — long the leading sanitary pumps on the market — now offer still more advanced design features that mean higher efficiencies, greater sanitation, easier cleaning and less maintenance. The new Flexflo involute pump body enables them to pump the same volume with less horsepower. They are equipped with the new type sanitary motor. This pump meets 3A Code standards. Capacities to 70,000 lb. per hour.

6 IMPORTANT IMPROVEMENTS

1. New Balanced Sanitary Rotary Seal — longer lasting.
2. Heavier Construction — less danger of crushing or distortion. Better gasketing — seals with less pressure.
3. All-Welded — no soldering.
4. More Sanitary — easy to clean — no sharp corners or hard-to-reach surfaces.
5. New Sanitary Motors — totally enclosed and splashproof.
6. Higher Efficiencies.

Send for Information. Ask your Cherry-Burrell representative or use this coupon to get more information on the new Flexflo.



The new Flexflo disassembles easily for cleaning — is just as easily reassembled.

CHERRY-BURRELL CORPORATION

General Sales and Executive Office:
427 W. Randolph Street, Chicago 6, Illinois
Milk and Food Plant Equipment and Supplies
FACTORIES, WAREHOUSES, BRANCHES, OFFICES, OR DISTRIBUTORS AT YOUR SERVICE IN 56 CITIES

trendmaker in a great industry

Cherry-Burrell Corporation
Dept. 117, 427 W. Randolph Street
Chicago 6, Ill.

☐ Send more Flexflo information
☐ Have representative call

Name .....

Firm Name .....

Address .....

City ..... Zone .... State .....

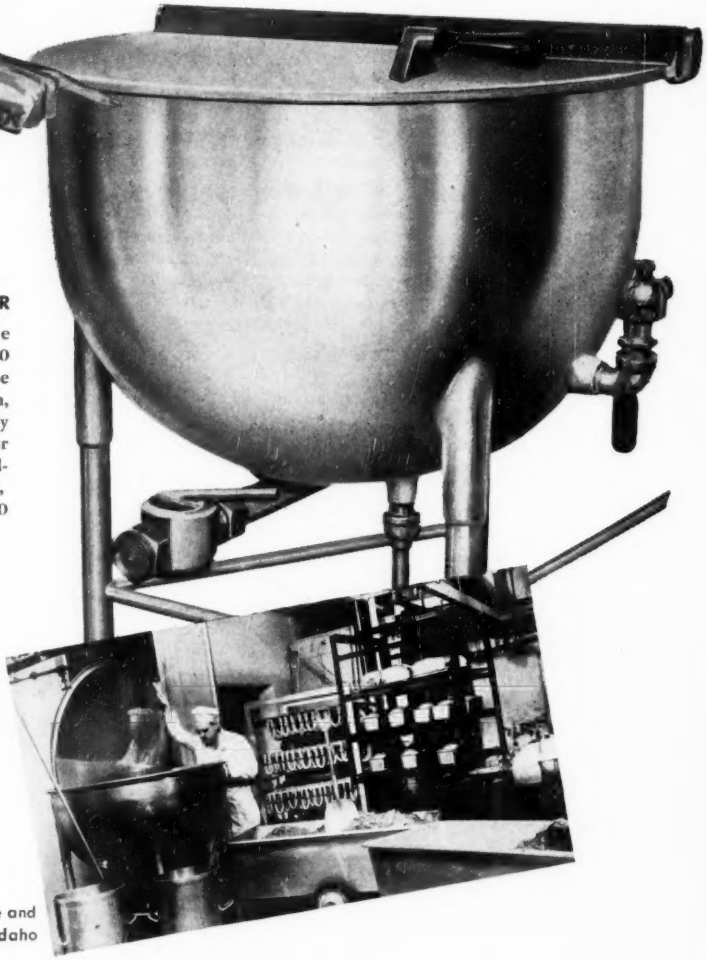
TWO SIMPLE

1 YOU CAN'T TOUCH WEAR·EVER FOR HEAT

Place your moistened finger lightly on the top edge of a Wear-Ever aluminum steam-jacketed kettle in use. (Be careful you don't burn yourself.) Wear-Ever Aluminum spreads heat so well that even the sides *above the jacket line* get hot enough to cook your product thoroughly. *That means more production per hour per Wear-Ever aluminum kettle.*

SPACE SAVER

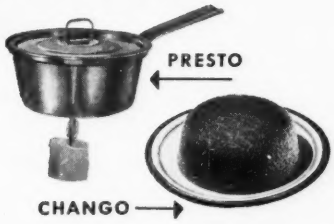
The new type Wear-Ever 100 gallon kettle stands 44" high, and occupies only 7.9 sq. ft. of floor space. Also available in 10, 20, 30, 40, 60, 80 and 150 gallon sizes.



Wear-Ever kettle and equipment, King Packing Company, Nampa, Idaho

KETTLE TESTS IT WILL PAY YOU TO TRY

2 YOU CAN BAKE A CAKE WITH A CANDLE



Aluminum makes such efficient use of heat that the flame from a plumber's candle is enough to bake an honest-to-goodness edible cake in an aluminum sauce pan. And do it in about 40 minutes! This shows why Wear-Ever aluminum steam-jacketed kettles process foods so efficiently at low pressures. Ask your Wear-Ever representative to perform this test for you, in your office.

New Wear·Ever kettle shape saves floor space without sacrificing heating efficiency

The new Wear-Ever kettle shape gives all the efficiency of a broad, shallow kettle that has a steam jacket running to the very top. But it also provides the space-saving efficiency of a deep-type kettle, where the jacket ends about two-thirds the way up the sides.

The secret—Wear-Ever Aluminum which is such a splendid conductor of heat that Wear-Ever kettles quickly reach cooking temperature right to the very top—give more production per hour per kettle.

The new Wear-Ever steam-jacketed kettles, moreover, are made of an extra hard aluminum alloy that has proven its ability to withstand hardest usage in food plants. It should enable Wear-Ever kettles to easily beat their many previous records of more than 20 years of daily active service.

For full details about the features of Wear-Ever Aluminum Steam-Jacketed Kettles mail the coupon to: The Aluminum Cooking Utensil Company, 303 Wear-Ever Building, New Kensington, Pa.

The Aluminum Cooking Utensil Co.,
303 Wear-Ever Bldg., New Kensington, Pa.
Please have your representative call to

☐ Tell us more about W.E. Steam-Jacketed Kettles.
☐ Demonstrate the Baking a Cake with a Candle Test.

NAME _____

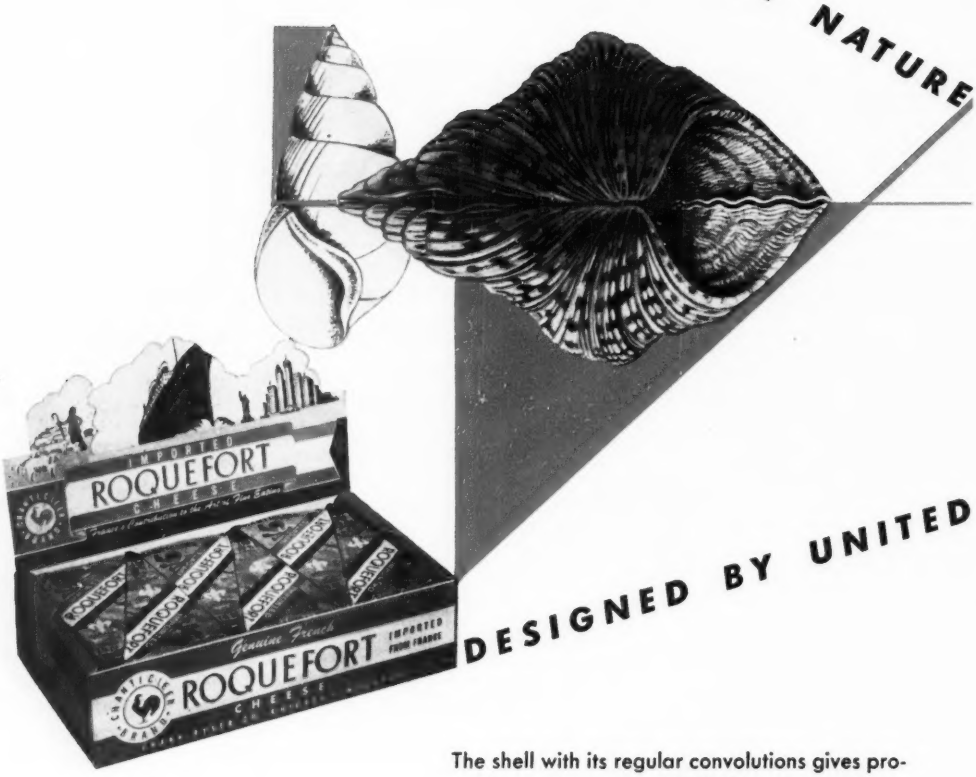
FIRM _____

ADDRESS _____

CITY _____ STATE _____

MAIL TODAY

DESIGNED BY NATURE



DESIGNED BY UNITED

The shell with its regular convolutions gives protection and beauty. UNITED'S staff of package designers gives your product that same combination of service and symmetry. Let UNITED protect and perfect your interests.

UNITED *Packages are:*

*labor saving	set up quickly
*skillfully engineered	product recognition
*time saving	fill freely

WRITE, WIRE OR PHONE UNITED TODAY, WE ARE READY TO SHOW YOU WHY

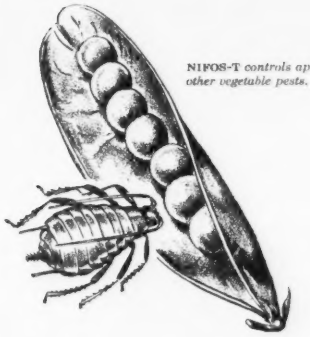
IT PAYS TO PACKAGE WITH UNITED

UNITED BOARD & CARTON CORPORATION

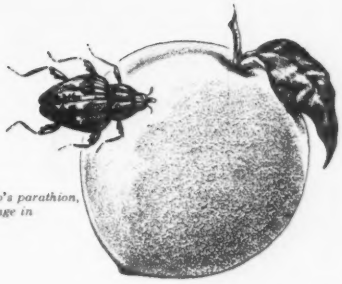
Folding Cartons and Package Specialties • From Pulp to Finished Product

P. O. BOX 1318, SYRACUSE, NEW YORK

CARTON PLANTS: VICTORY MILLS, SYRACUSE, COHOES, BROOKLYN, N. Y., SPRINGFIELD, O., BOARD MILLS: LOCKPORT, THOMSON, N. Y., URBANA, O.



NIFOS-T *controls aphids and other vegetable pests.*



NIRAN, *Monsanto's parathion, checks insect damage in many fruits.*

SANTOBANE *kills many on-the-premise insect pests.*

COMPOUND 1080, *most powerful of all rodenticides. Extremely poisonous. Can be used in the food industry only in accordance with federal government regulations.*

SANTOBANE, *Monsanto's DDT, is efficient in controlling corn borer. MONSANTO 2,4-D halts weeds without harming most grains.*

Monsanto Chemicals help food industry get rid of costly weeds and insects

From the time crops pop out of the ground until foods are processed, weeds and insects threaten your production and quality. It's profitable for you to get rid of pests, and this long list of Monsanto Chemicals will help you do it:

MONSANTO HERBICIDAL CHEMICALS

2,4-D ACID • 2,4-D SODIUM SALT • 2,4-D ISOPROPYL ESTER • 2,4,5-T ACID • 2,4,5-T ISOPROPYL ESTER • SANTOBRITE* (Sodium Pentachlorophenate, Tech.) • SANTOPHEN* 20 (Pentachlorophenol, Tech.) • ISOPROPYL N-PHENYL CARBAMATE

MONSANTO INSECTICIDAL CHEMICALS

ortho-DICHLOROBENZENE (Commercial Grade) • SANTOBANE* (DDT) • SANTOCHLOR* (*para*-Dichlorobenzene) • SANTOPHEN 20 (Pentachlorophenol, Tech.) • TRICHLOROBENZENE, Technical • NIFOS*-T (Tetraethyl Pyrophosphate, Tech. For agricultural use only) • NIRAN* (Parathion. For agricultural use only)

MONSANTO RODENTICIDE — Compound 1080*

Specify Monsanto Chemicals and be *sure* of quality. For herbicides and insecticides, see your formulator or custom sprayer. To get rid of on-the-premise pests, see a qualified pest control operator. For information on any Monsanto Product, mail the coupon or contact the nearest Monsanto Sales Office. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1737-C South Second St., St. Louis 4, Mo.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS for PLASTICS

MONSANTO CHEMICAL COMPANY
Organic Chemicals Division
1737-C South Second Street, St. Louis 4, Missouri

Please send information on .....

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Company .....

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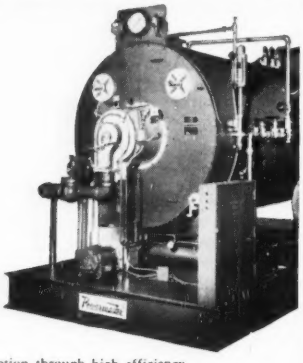
City ..... *Zone* ..... *State* .....

SERVING INDUSTRY . . . WHICH SERVES MANKIND

CUT your STEAM COSTS as much as 40% with the O&S Powermaster Steam Generator



Plant operators in many industries are cutting costs up to 40% through advantages like these:

- Low fuel consumption through high efficiency
- Packaged design saves excessive installation costs
- Automatic operation frees engineer for other duties
- Mounted on steel base—no bricking required
- Delivered fully wired and tested—U. L. approved
- Widespread service by factory-trained men

High and low-pressure units—15 to 300 HP.—for light oil, heavy oil, gas or combination gas-oil firing. Free catalog mailed promptly—use coupon below.

ORR & SEMBOWER
Established 1885
Powermaster®
STEAM GENERATORS

ORR & SEMBOWER, INC.
941 Morgantown Rd., Reading, Pa.

Please mail latest catalog showing Powermaster's cost-cutting advantages.

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Company_____

Address_____

City_____ Zone_____ State_____

HOWE

TO PUT THE INDIAN SIGN ON HIGH REFRIGERATION COSTS!

HERE'S HOWE
SHELL AND TUBE CONDENSERS
(REMOVABLE TUBE DESIGN)
Install NOW!

YOU SAVE money, space, labor, time, with Howe individually engineered installations, large or small. You get that constant exact temperature and humidity control which in thousands of plants is keeping products at top quality. Howe Shell and Tube Condensers can be compactly grouped in batteries for multiple installations, for any capacity plant. Both shell and tube and shell and coil types for Freon.

OUTSTANDING FEATURES • RETUBING — without special tools • RETUBING — without experienced mechanics • TUBES — standard material purchasable in any locality.

HOWE EVAPORATIVE CONDENSERS save 95% on water, as well as space. Ideal for restricted water areas.

GET THE BENEFITS of Howe's 38 years of practical, test-proved refrigeration knowledge and their ruggedly built, trouble-free equipment. Write for free booklet, or without obligation consult Howe engineers on your specific problems.

SINCE 1912, BUILDERS *exclusively of ammonia and Freon compressors, condensers, coolers, fin coils, locker freezing units, air conditioning (cooling) equipment. Immediate delivery!*

HOWE
ICE MACHINE CO.

Distributors in Principal Cities. Cable Address: Himco, Chicago

2817 MONTROSE AVENUE • CHICAGO 18, ILLINOIS

A few territories still open . . . write for details about the HOWE profit-plan for new distributors

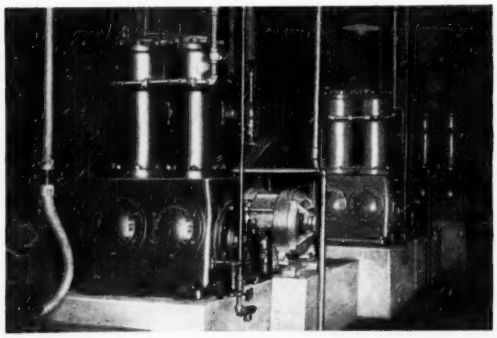


PHOTO: SPRATT'S (AMERICA) LTD., NEWARK, N. J.

Who Said An Old Dog Can't Learn New Tricks?

Spratt's Dog Biscuits enjoy "competitive packaging." They are automatically net weighed and filled with superior accuracy at high speeds. The hero is a Wright Hy-Tra-Lec Weigher . . . that time-tested yet comparatively new weigher which is reducing packaging costs in more than 125 leading plants.

Can you use this new weighing system to advantage in your company? Here's a clue:

Wright's weigher utilizes the principles of "positive displacement" for the first time in automatic packaging machinery. Range is one-half ounce to 16 ounces. Fully automatic operation for rigid containers. Semi-automatic when bags are used. Available with single or multiple weighing head units.

Products handled to date include a host of dry food products, hard candies, gum slices, marshmallows, potato chips, pretzels, cookies, crackers, corn chips, shelled nuts, small metal and wood parts.

Let us tell you more. The coupon below is for your convenience. Write . . . today!

WRIGHT MACHINERY COMPANY

ESTABLISHED 1893 · DURHAM, NORTH CAROLINA
SUBSIDIARY OF THE SPERRY CORPORATION

COMPANY SALES OFFICES: JERSEY CITY · CHICAGO · DURHAM
WEST COAST REP.: KING & ANDERSON, SAN FRANCISCO
SOUTHWEST REP.: R. P. ANDERSON COMPANY, DALLAS
CENTRAL REP.: HAL HUDSON EQUIPMENT COMPANY, TOLEDO
EUROPE: SPERRY GYROSCOPE COMPANY, LTD., LONDON

Wright Machinery Company
333 Calvin Street, Durham, N. C.

Gentlemen: Please send me latest information on your Hy-Tra-Lec Automatic Weighers.

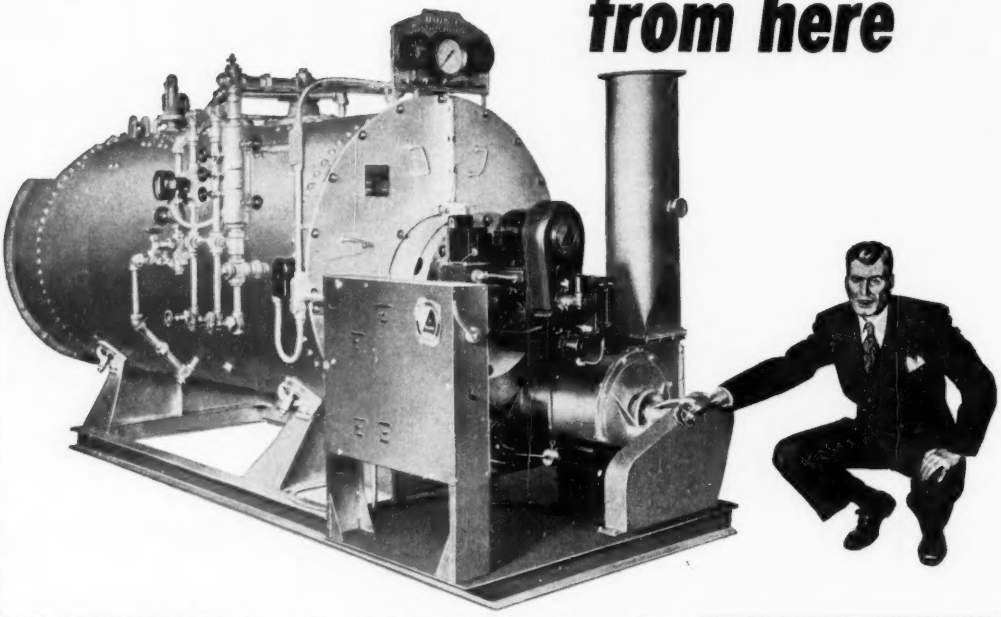
Name.....

Company.....

Address.....

City..... State.....

WHY....PREFERRED'S DRAFT *is pulled through from here*



PULL-THROUGH DRAFT, pioneered by Preferred, is one of several features which contribute to the extra efficiency, safety, and economical installation of Preferred Unit Steam Generators.

Preferred's Induced Draft *pulls* the hot gases of combustion through the four passes. It completely eliminates the need of erecting an expensive stack . . . assures the exact amount of air for perfect combustion regardless of atmospheric conditions . . . and prevents the products of combustion from being forced into the boiler room.

Induced Draft tends to keep the flue passes clean of the solid products of combustion. A still-air trap permits the solids to drop into a clean-out compartment, from which they may be easily removed.

Air is drawn through ports in the combustion chamber refractory lining, thereby pre-heating the air and cooling the refractory.

The electric motor is smaller . . . the fan quieter . . . because *induced* gas flow is smoother. The air is drawn gently into the combustion chamber, thereby aiding ignition. The burner won't ignite before the fan starts; gas passes are thoroughly purged prior to ignition.

These many benefits of pull-through draft are the result of Preferred's policy of progressive engineering and design improvement . . . a policy of producing the best possible steam generating plant.

Write for your copy of Bulletin 1000-E. It describes in detail the features of the Preferred Unit Steam Generator. Ask also for the revealing, non-advertising booklet, "Dividends from Your Power Plant."

ADDITIONAL FEATURES OF PREFERRED UNIT STEAM GENERATOR

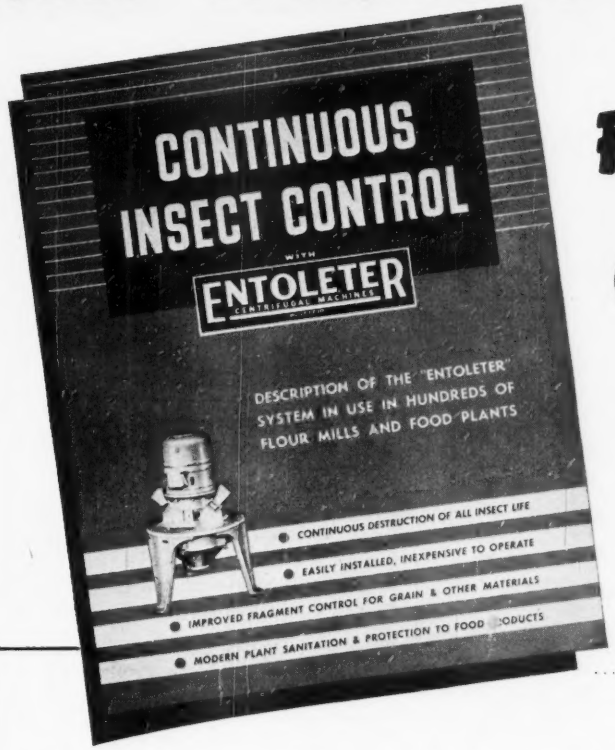
1. Fully Automatic Operation—even with Bunker C or No. 6 oil.
2. Preferred Oil Burner—exclusive aid to perfect combustion, built especially for this unit.
3. Four-pass, Down-Draft Gas Travel—results in maximum heat absorption.
4. 80% Minimum Thermal Efficiency—proved and guaranteed.
5. Low Maintenance—the result of over 27 years of combustion engineering experience.
6. Full Range of Sizes—from 40 to 500 H.P., pressures of 15 to 200 lbs. Two-pass Units in 20 and 30 H.P. and 15 lbs. pressure.

PREFERRED UTILITIES MANUFACTURING CORPORATION, 1860 Broadway, New York 23, N. Y.

PREFERRED UTILITIES MFG. CORP.

F1-19F

KEEP YOUR FOOD PRODUCTS FREE OF INSECT LIFE


CONTINUOUS
INSECT CONTROL
WITH
ENTOLETER
CENTRIFUGAL MACHINES
DESCRIPTION OF THE "ENTOLETER" SYSTEM IN USE IN HUNDREDS OF FLOUR MILLS AND FOOD PLANTS
CONTINUOUS DESTRUCTION OF ALL INSECT LIFE
EASILY INSTALLED, INEXPENSIVE TO OPERATE
IMPROVED FRAGMENT CONTROL FOR GRAIN & OTHER MATERIALS
MODERN PLANT SANITATION & PROTECTION TO FOOD PRODUCTS

. . . illustrated bulletin sent on request.

BUG-LIFE doesn't have a chance to spoil food products when "ENTOLETER" Continuous Insect Control is installed in mills and food plants. With this tested and proved protection, you benefit 3-ways:

- SAFEGUARD YOUR PRODUCTS FROM BUGS & FRAGMENTS
- EXTEND YOUR SELLING SEASON WITHOUT FEAR OF "TURN-BACKS" OR SEIZURES
- ENJOY THE PROFITS IN SUMMER SALES

Operating records show that "ENTOLETER" Control destroys insect life in all its forms, in flour, meal, mixes, cereals, powdered soups and similar free-flowing dry materials. In addition to its primary function of insect control, the "ENTOLETER" system is an excellent means of blending flours, mixing compounds and improving vitamin distribution. It is wholly mechanical; uses no heat, gas or chemicals, and does not change moisture content of "ENTOLETER" products. The system is easy to install; simple to operate and maintain. Send coupon now for full information on "ENTOLETER" Control. We shall be glad to show how it can be applied to your products.

ENTOLETER
CENTRIFUGAL MACHINES

CONTINUOUS INSECT CONTROL SYSTEM

ENTOLETER DIVISION
The Safety Car Heating and Lighting Co., Inc.
P.O. Box 904, New Haven 4, Conn.

Send full information on "ENTOLETER" Continuous Insect Control System.

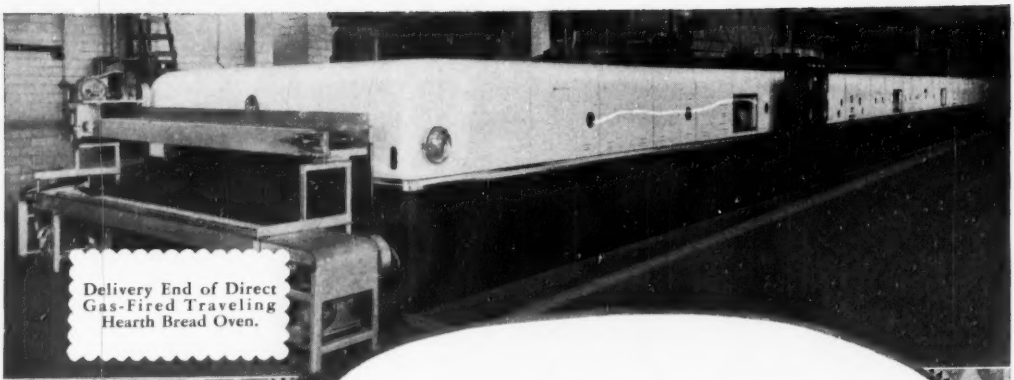
Name .....

Company .....

Address .....

City, Zone and State .....

Foreign Distributors Henry Simon, Ltd., Stockport, England



Delivery End of Direct Gas-Fired Traveling Hearth Bread Oven.

VARIETY BREAD-BAKING OPERATIONS AT GENERAL BAKING COMPANY EMPHASIZE FLEXIBILITY OF MODERN GAS OVENS

OPERATING FLEXIBILITY, essential in the maintenance of bakery schedules, is obtained by General Baking Company with its modern Gas-fired AMF Traveling Hearth Oven in the Richmond, Virginia, Bond Bakery.

With a production capacity exceeding 4000 loaves per hour, this four-zone Gas Oven is used for two types of Bond Bread, as well as for baking whole wheat, cracked wheat, and rye types. Automatic controls maintain the proper temperature in each zone and the Gas-firing system is so effective that the oven preheats in less than an hour.

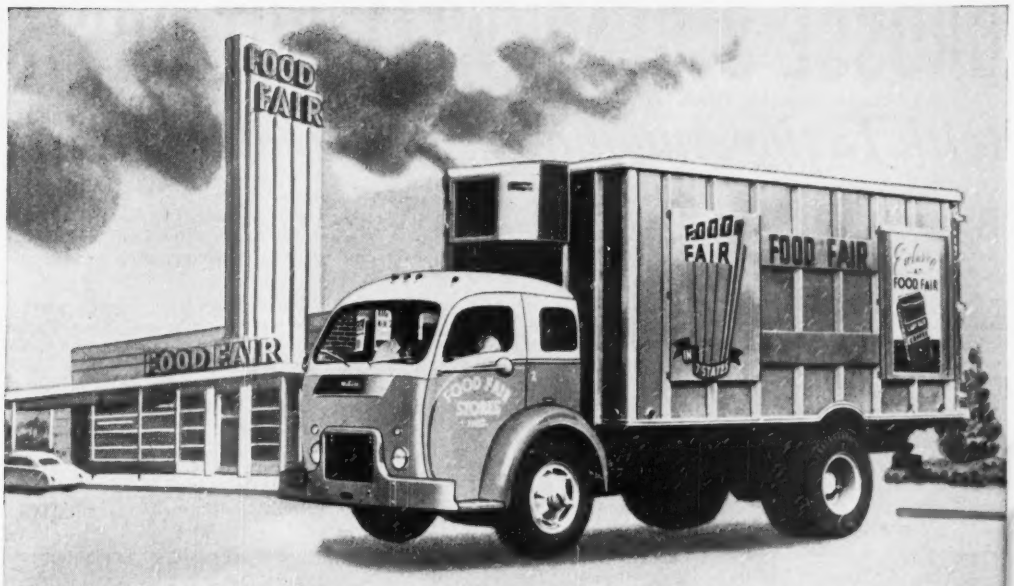
Equipped with automatic loader and continuous discharge conveyor, this modern traveling hearth oven operates at maximum fuel efficiency because sensitive controls maintain precise temperatures according to the heat demand in each zone. This extreme flexibility is typical of modern Gas-fired Bake Ovens, the type of service you may expect from GAS in baking operations. Call your Gas Company Representative for details.

Photos Courtesy American Machine & Foundry Company, New York and New Haven, Mfrs. of Ovens and Bakery Equipment.

View of Feed End shows portion of the automatic loader on this 100-foot long oven.

MORE AND MORE... THE TREND IS TO GAS FOR ALL COMMERCIAL BAKING

AMERICAN GAS ASSOCIATION 420 LEXINGTON AVENUE, NEW YORK 17, N.Y.



No Other Truck So New!

So Useful...So Economical!

FOOD FAIR STORES speed the flow of perishable foodstuffs from warehouse to customer by White Truck . . . depending on their fleet of carefully selected Whites to handle this complex food transportation job.

Narrow streets and heavy traffic in congested areas provide a real test for the *entirely new* White 3000 . . . and results have been amazing. These new Whites get in and out of congested places in far less time . . . with greater ease . . . and with new safety. They save time and reduce costs in every phase of delivery service. See your White Representative for facts about the economy and efficiency of this great new White.

THE WHITE MOTOR COMPANY
Cleveland 1, Ohio, U. S. A.
THE WHITE MOTOR COMPANY OF CANADA LIMITED
Factory at Montreal

FOR MORE THAN 50 YEARS THE GREATEST NAME IN TRUCKS

CROSSE & BLACKWELL CUT COSTS

with Taylor Automatic Juice Heater Control

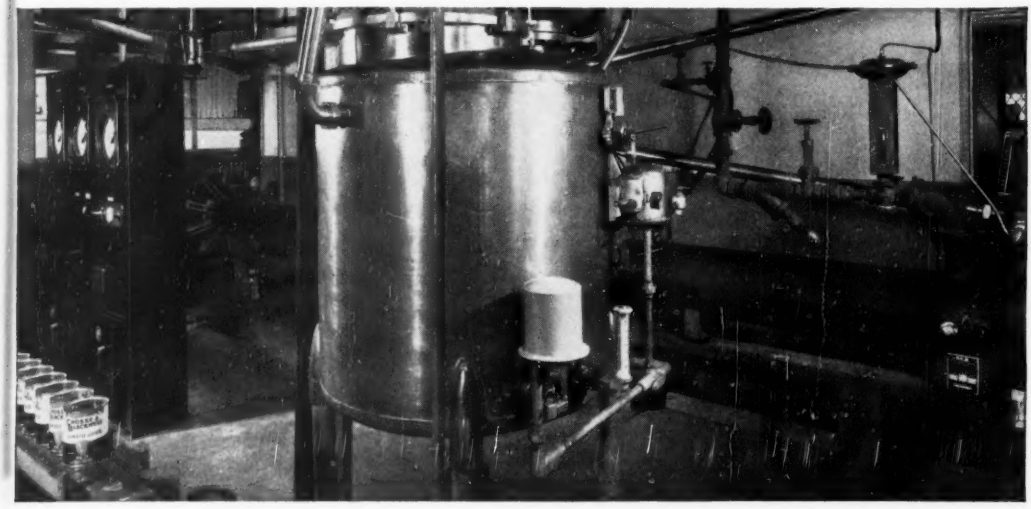
BELOW is a new Chain Belt Juice Heater at Crosse & Blackwell's big plant near Baltimore. The unit is a combination pre-heater, sterilizer, regenerator, cooler and deaerator. Masterminding the operation is that panel of Taylor Fulscope* Recording Controllers, left.

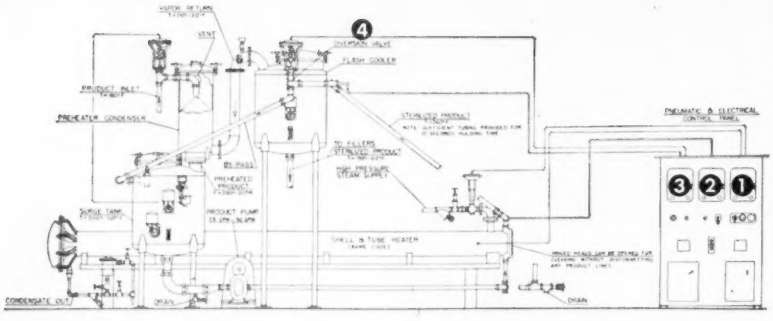
Lower costs and greater product uniformity have resulted from the unique control system which has minimized shut-downs to remove "burn-on". Special over-ride pressure control holds steam pressure at a minimum during critical start-up period, compensates for accumulated "burn-on" as it takes place. With pasteurization outlet temperatures held within ±1° F., more uniform flavor, appearance, and maximum production capacity are assured. This high accuracy of control results from the Taylor High-Speed Sanitary Thermal System (thermal lag of 2 seconds or less), the time-proven Fulscope Controller mechanism, and plenty of know-how in applying instrumentation to food processing problems.

You can get this kind of accuracy from properly selected and adjusted Taylor Control Systems. Your Taylor Field Engineer will give you full details on controls for juice heaters and many other food processing units: Blanchers, Lye Peelers, Exhausters, Retorts, Continuous Cookers, Cooling Canals, Deaerators, Jam and Jelly Kettles, etc. Write for catalog 500! Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

* Registered Trade-Mark

Instruments for indicating, recording and controlling temperature, pressure, humidity, flow and liquid level.





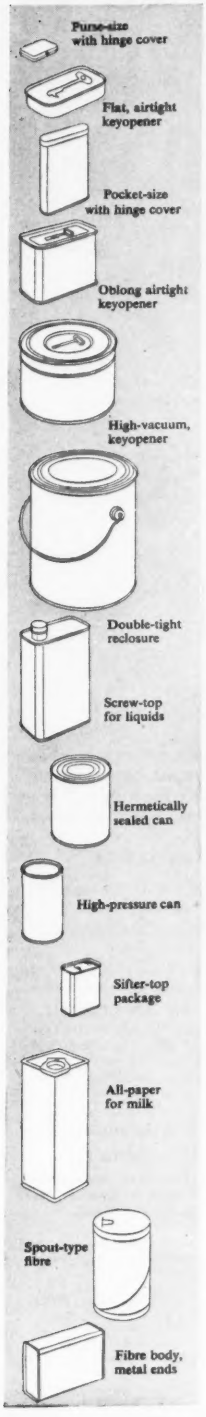
ABOVE: Taylor Fulscope Recording Temperature Controllers (left) on new Chain Belt Juice Heater (right) at Crosse & Blackwell's big plant near Baltimore. Results—uniform juice quality at lowest possible heating cost.

LEFT: Shell steam pressure is automatically controlled by Recording Pressure Controller (1), the control point of which is reset by Recording Temperature Controller (2) having its temperature-sensitive bulb in sterilizer outlet.

In event of improperly heated product, Controller (3) actuates Diversion Valve (4) to return product for re-heating.

TAYLOR INSTRUMENTS MEAN ACCURACY FIRST

WHICH PACKAGE SUITS YOUR PRODUCT?



Attached cover, smooth edges, snaps closed with bead lock giving rigidity to top surface with no distortion. Opens, closes with one hand. Can be coated inside, body, top and bottom if desired.
Contents readily accessible as top swings back and provides completely open container. Top aperture is wide enough to permit user to reach in with fingers and pick out contents. Comes in four sizes.

If you are packaging small items used in small quantities...

This container is most familiar as the package for short lengths of adhesive tape used for minor cuts and bruises.

Notice that the hinged snap-top opens easily, protects the contents from dust . . . that the package makes a nice display and keeps clean after handling.

Perhaps you are packaging cold tablets, salt tablets, rubber bands, nails, nuts, bolts, playing cards, king-size cigarettes, whole spices, notions, buttons, *or some other small item used in small quantities.*

Might it not be a good idea for you and us to sit down together and see how our know-how might help you?

Pioneers, we . . .

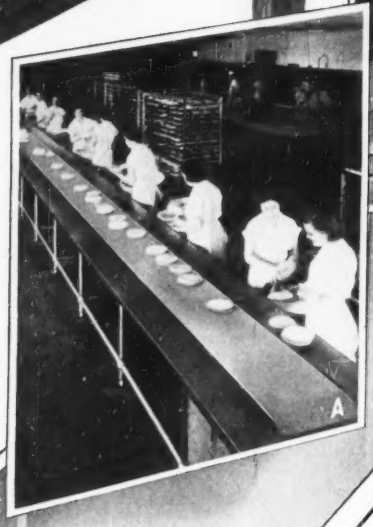
Since 1901, Canco has been creating new and more effective packages. There is hardly a major development in the packaging field that this keen organization has not pioneered.

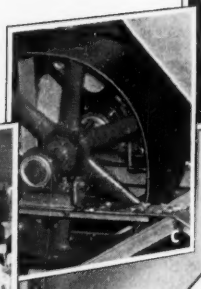
We can advise you on how to build sales, cut costs, improve processes, and on filling and closing procedures. We stand ready to serve you promptly in production-line emergencies. *Call Canco first!*

AMERICAN CAN CO.
CANCO
NEW YORK
CHICAGO
SAN FRANCISCO
HAMILTON, CANADA

Visit us, Booths 241 & 245, at the 19th AMA National Packaging Exposition, Chicago, Navy Pier, April 24-27.

ENROUTE TO LOWER FOOD PROCESSING COSTS VIA SANDVIK STAINLESS STEEL-BELT CONVEYORS





A. 1000 layer cakes per hour can be frosted and packed on this 18-inch stainless Sandvik belt table.

B. Distributing, wrapping and boxing sliced bacon on Sandvik stainless belt.

C. Top strand of Sandvik belt carries tuna to be cleaned and packed . . . lower strand returns refuse.

D. Twin Sandvik conveyors used for preparing fruit in a baby food plant.

SANDVIK STEEL-BELT CONVEYING WORK TABLES ARE THE MODERN, LOW-MAINTENANCE WAY TO HANDLE FOOD IN PREPARATION, PROCESSING, PACKING, GRADING, INSPECTION, ETC.

ADVANTAGES

- **EASY TO KEEP CLEAN** — Live steam or boiling water can be applied directly.
- **SMOOTH IMPERMEABLE SURFACE** — No place for food particles to lodge.
- **LONG SERVICE LIFE** — Inherent high strength and resistance to time and wear.
- **ENGINEERED TO FIT APPLICATION** — Lengths to meet any center distance. Type 302 or 316 stainless. With or without cooling arrangement. Standard or special work tables. Can be arranged for any worker position . . . standing, sitting or facing along the belt.

Write, wire or 'phone for further information.

SANDVIK STEEL, INC., *Conveyor Department*
111 Eighth Ave., New York 11, N. Y., WAtkins 9-7180
Manufacturers of Steel-Belt Conveyors For Over 30 Years

SANDVIK STEEL BELT CONVEYORS

SS-55

JUST A FEW OF THE COMPANIES WHERE SANDVIK STEEL-BELT CONVEYORS ARE USED

American Can Co.
American Sugar Refining Co.
Armour & Co.
Beechnut Packing Co.
Campbell Soup Co.
Canada & Dominion Sugar Refining Co., Ltd.
J. B. Carr Biscuit Co.
Consolidated Biscuit Co.
Corn Products Refining Co.
Crosse & Blackwell Co.
Cudahy Packing Co.
Curtis Candy Co.
Cushman's Sons Inc.
First National Stores
Franklin Baker Co.
General Foods Corp.
Gerber Products Co.
Adolf Gobel Inc.
Great Atlantic & Pacific Tea Co.
Hanscom Baking Corp.
Hershey Chocolate Corp.
Hygrade Food Products
Keebler Weyl Baking Co.
Krug Baking Co.
Loose-Wiles Biscuit Co.
Megowen-Educator Food Co.
John Morrel & Co.
Morton Salt Co.
National Biscuit Co.
National Sugar Refining Co.
Ralston Purina Co.
Rockwood & Co.
Rumford Chemical Works
Schutter Johnson Candy Co.
Southern Cotton Oil Co.
Spaulding Bakeries
Stahl-Meyer Inc.
Swift & Co.
Ward Baking Co.
Wilson & Co.
Worcester Salt Co.

Universal FOOD ACIDULANT

● "Universal" covers a lot of ground but probably no other acidulant is as widely used in the food industry as citric acid. The technical reasons for this acceptance are many, and they are further supported by the fact that citric acid is edible, non-toxic and palatable.

Citric acid is commonly used as an acidulant in the preparation of many food products such as beverages, candies, drink powders, gelatin desserts, jams and jellies. In all of these products it serves to impart the tartness which enhances the flavor and furnishes the tang.

The salts of citric acid are also widely used in the food industry. For example, sodium citrate is used as an emulsifier for processed cheese. Calcium citrate is the setting agent in alginate jellies and has been suggested as an ideal product for use in the firming of canned tomatoes and similar products.

Both Pfizer Citric Acid and Sodium Citrate are available as the USP products and as Anhydrous Citric Acid and Anhydrous Sodium Citrate. Pfizer also markets a highly purified Calcium Citrate. For further information write Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N. Y.; 425 North Michigan Avenue, Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.

PFIZER QUALITY ® PFIZER

Manufacturing Chemists for Over 100 Years

Koronet HAIR GUARDS

NOW...

SERVING OVER 50% OF THE NATION'S FOOD INDUSTRIES!

SAVING OVER 70% OF YOUR WOMEN WORKERS' HEADWEAR COSTS!

KORONET HAIR GUARDS ARE NATIONALLY FAVORED *Because*

- ✓ They are sanitary. Hair always completely covered—simply, smartly. Permit natural air circulation.
- ✓ They are economical. Cost only a few pennies more than an ordinary hairnet. Neatly webbed, of strong durable texture, designed for long service. No laundering, starching or ironing bills.
- ✓ They provide utmost protection. No loose or falling hair. Comply with all provisions of the Pure Food Act. Highly recommended by government food inspectors.
- ✓ They are comfortable. Cool, light, snug fitting, adjustable to any headsize.
- ✓ They are attractive. Flattering with all modern hair styles. Lend pleasing air of uniformity to both plant and employee appearance.

● Wherever introduced, Koronet Hair Guards have been enthusiastically approved by both management and employees alike. They are now a prime requisite in major food processing plants here and abroad. By providing your women workers with this economical, sanitary and attractive product you are performing an essential service for your plant and your employees.

ADVERTISING VALUE!

The KORONET Hair Guard is an exclusive patented product. Any name, trademark or slogan you desire can be imprinted on the shield in your choice of one or more colors. This is an ideal and inexpensive way to advertise your products.

Free Samples!

Take advantage of this offer. Prove to yourself that Koronet Hair Guards are a must for your plant. Write today for FREE SAMPLE, literature and prices!

REGAL MFG. CO. 3203-05 ELSTON AVE. CHICAGO 18, ILLINOIS

CORROSION - PROOF

facts for the food Industry

These bulletins may have the answer to your corrosion problem. Drop us a card today . . . We will send them promptly, without charge or obligation.

PROTECTIVE COATINGS
bulletin 7-1
Covers an entire series of protective coatings, applicable on concrete, metal, or wood surfaces for industry.

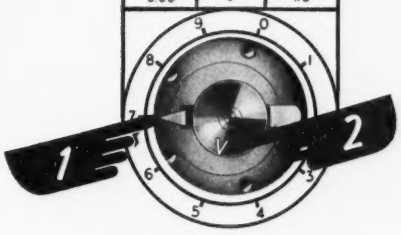
ACID & ALKALI PROOF FLOORS
bulletin no. 3
Pictorially shows specific applications of Atlas ALKOR Jointed Tile Floors.

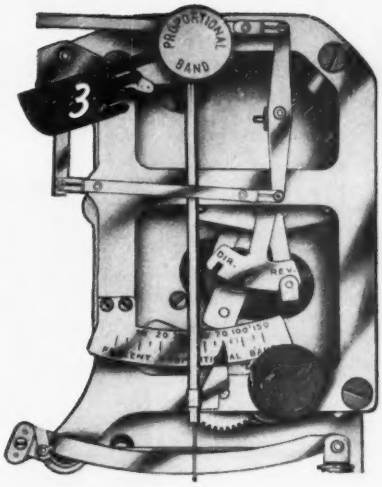
THE ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNA. HOUSTON, TEXAS

Corrosion Proof LININGS	Corrosion Proof CEMENTS	Corrosion Proof COATINGS	Corrosion Proof FLOORS	Corrosion Proof TANKS

ATLAS HAS SERVED INDUSTRY OVER HALF A CENTURY

DERIVATIVE TIME	SCALE SETTING	RESET RATE
0	0	0
.1	1	.03
.15	2	05
.25	3	.08
.40	4	.12
.75	5	.18
1.20	6	.25
2.00	7	.35
3.00	8	.50
5.00	9	.75





if you use . . . or plan to use . . . automatic control instruments

you should investigate

these **THREE EXCLUSIVE ADVANTAGES** you get in

BRISTOL series 500 air-operated controllers

1. Reset Rate . . .
2. Derivative Time . . .
3. Proportional Band . . .

ADJUSTMENTS ARE ACCURATELY CALIBRATED AND EXACTLY REPRODUCIBLE

The reset scale is calibrated in actual reset rate. The proportional band scale is graduated in percent of proportional band. The derivative scale is calibrated directly in minutes.

This makes possible the exact duplication of controller adjustments for any process throughout a national organization.

It also makes possible the replacement of controllers on a process with full assurance that such replacements will exactly duplicate the performance of the original—eliminates the cut-and-try method of arriving at the original setting—saves hours by cutting down on shut-down time.

Accurate reproducibility is only one of the many advantages you get in Series 500 Air-Operated Controllers which exemplifies the outstanding instrument engineering Bristol puts into its complete new line of Series 500 recording and controlling instruments—products of over 60 years of instrument experience.

Write for new Bulletin A120 on Series 500 Air-Operated Controllers. THE BRISTOL COMPANY, 115 Bristol Road, Waterbury 20, Conn.

BRISTOL

Engineers process control for better products and profits

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

America finds a new, easy way to save

Out of the war has come one blessing—a lesson in thrift for millions of those who never before had learned to save.

Enrolled under the Payroll Savings Plan in thousands of factories, offices, and stores, over 27 million American wage earners were purchasing "E" Bonds alone at the rate of about 6 billion dollars worth a year by the time V-J Day arrived.

With War Bond Savings automatically deducted from their wages every week, thrift was "painless" to those wage earners. At the end of the war, many who never before had bank accounts could scarcely believe the savings they held.

The moral was plain to most. Here was a new, easy way to save; one as well suited to the future as to the past. Result: Today, millions of Americans are continuing to buy, through their Payroll Savings Plan, not War Bonds, but their peacetime equivalent— *U. S. Savings Bonds.*

From war to peace! War Bonds are now known as U. S. Savings Bonds, bring the same high return—$25 for every $18.75 at maturity.

Out of pay—into nest eggs! A wage earner can choose his own figure, have it deducted regularly from earnings under Payroll Savings Plan.

New homes to own! Thousands of new homes, like this, will be partially paid for through Bonds wisely accumulated during the next five to ten years.

Keeping cost of living in check! Buying only needed plentiful goods and saving the money which would bid up prices of scarce goods keeps your cost of living from rising. Save *automatically—regularly.*

Weekly Savings	SAVINGS AND INTEREST ACCUMULATED In 1 Year	In 10 Years
$ 3.75	$195.00	$2,163.45
6.25	325.00	3,607.54
7.50	390.00	4,329.02
9.38	487.76	5,416.97
12.50	650.00	7,217.20
15.00	780.00	8,660.42
18.75	975.00	10,828.74

Savings chart. Plan above shows how even modest weekly savings can grow into big figures. Moral: Join your Payroll Savings Plan next payday.

SAVE THE EASY WAY...

BUY YOUR BONDS

THROUGH PAYROLL SAVINGS

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The Advertising Council

SPARK-O-SAN

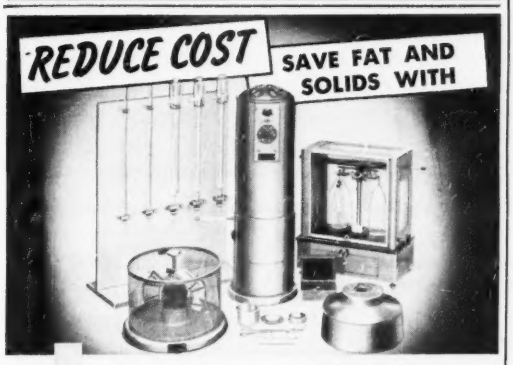
Patent Applied For

it's new!

- A bottle washing compound combining organic chemistry with highly caustic materials to give economical operation, free rinsing and a complete tie-up of hard water salts, assisting in the control of hard water scale formation on bottle washing machines and assuring sparkling clear clean bottles.
- The development of SPARK-O-SAN is a revolutionary approach to the problem of controlling scale formation where the use of strong caustic compounds is desired and the success of this research is evidenced by very satisfactory results obtained under many and varied conditions.
- SPARK-O-SAN is finding its place in many fields, such as the mechanical washing of bottles in dairy, carbonated beverage plants and breweries, etc.; in cleaning vacuum pans it is proving very effective. In fact, a whole new vista has been opened up with the development of this combination organic-inorganic thinking as pertaining to cleaning chemicals.
- The chelating compound added to the caustic soda in SPARK-O-SAN is stable, will not break down under continued usage or high temperatures regardless of the length of time the solution is maintained at such elevated temperatures.
- SPARK-O-SAN is available for immediate shipment on order. Direct your inquiries or orders to—

BONEWITZ CHEMICALS, INC.

Burlington, Iowa Manteca, Calif.



DIETERT DETROIT SOLFAT DETERMINATOR

Be sure your product is up to standard.

1. Complete unit $532.50 without balance
2. Requires only 8 sq. ft. space
3. Highest accuracy ± .01%
4. Handles all dairy products
5. Complete analysis in 20 minutes

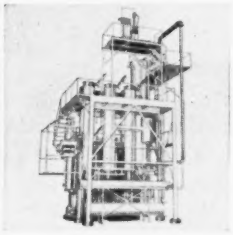
WRITE TO DEPT. B-4 FOR LITERATURE

CONTROL EQUIPMENT
HARRY W. DIETERT COMPANY
9330 ROSELAWN • DETROIT 4, MICH.

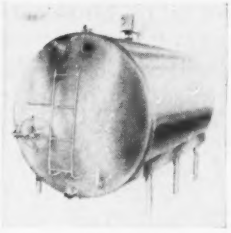
The list is growing!
More products are being processed with
▶HIGHEST PRODUCT QUALITY
▶LOWEST OPERATING COST

on Mojonnier FOOD PROCESSING EQUIPMENT

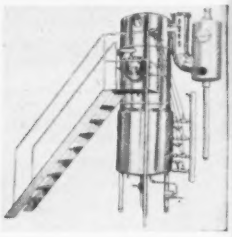
Here are key units of Mojonnier Food Processing Equipment, proved outstandingly successful in the Food Industry.



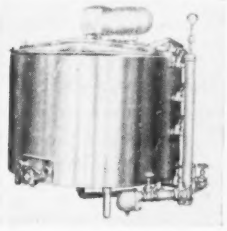
LO-TEMP EVAPORATORS produce 4 to 1 concentrates at 60° F., protecting flavor, color, vitamin content. The Lo-Temp is ideally suited for concentrating grape juice, syrup for wine, apple juice, dairy products, pectin solutions, liquid egg, sucrose juice, pharmaceuticals and chemicals.



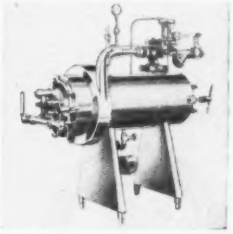
COLD-WALL TANKS provide fast, safe, direct-ammonia cooling for all liquid food products.



FRUIT SPREAD COOKERS provide 134° F. vacuum cooking for jams, jellies, preserves, honey, marmalade, etc. Protects physical and chemical composition of fruit.



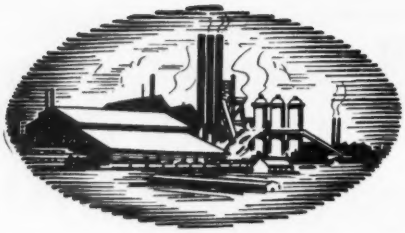
ZONE-CONTROL VATS provide fast, flexible heating, cooling and mixing for a wide range of liquid foods.



TUBULAR HEAT EXCHANGERS provide fast accurate heating and cooling for honey, vinegar, vegetable pulp, etc. Same unit adapted for use with refrigerants is ideal for cooling citrus and other fruit juices, coffee, liquor, etc.

For advice on your food processing problems, consult now with experienced Mojonnier engineers.

MOJONNIER BROS. CO.
4601 W. OHIO ST., CHICAGO 44, ILL.



1900 ★ THE MIRACLE OF AMERICA ★ 1950

Freedom and Progress

It's no stretch of the imagination, rather, robust realism to call our past half century a Miracle—U. S. A.

America has set an amazing record of progress in 50 years—but a moment in the history of civilization. A record unequalled by any other political or economic system.

Merely by broad brush strokes, we can all visualize this miracle. Remember the crystal set, the hand-cranked car, the biplane? A far cry from our FM radio, television, hydro-matic drive and supersonic planes.

And here's another phase of the miracle that went hand-in-hand with these and the myriad of intertwined technological advances—ranging from the radio telephone and Bakelite to the X-ray tube and teletype . . . and to atomic energy and its untold potentialities.

- Since 1900 we have increased our supply of machine power 4½ times.
- Since 1900 we have more than doubled the output each of us produces for every hour we work.
- Since 1900 we have increased our annual income from less than $2400 per household to about $4000 (in dollars of the same purchasing power), yet . . .
- Since 1900 we have cut 18 hours from our average work week—equivalent to two present average workdays.

How did we do it? The basic cause for this composite miracle has been the release of human energy through FREEDOM, COMPETITION and OPPORTUNITY. And one of the most important results is the fact that more people are able to enjoy the products of this free energy than in any other system the world has ever known.

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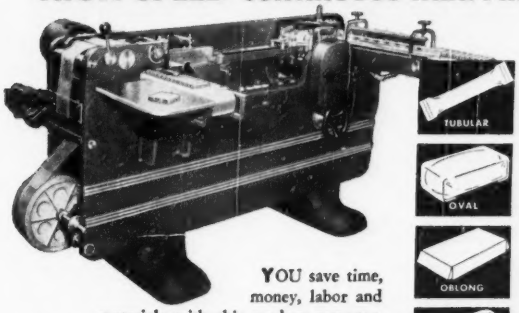

YOU save time, money, labor and materials with this modern wrapper. Only one operator and one helper are required to deliver up to 150 units per minute, fully glued or heat sealed. Wraps products of all shapes with any type of wrapping material — without stiffeners, unless desired, and without breakage! Ideal for numerous varied products and also available with hopper feed for stick candy and similar cylindrical items. Write for illustrated brochure and complete information.

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Simple design for low cost maintenance!
Precision engineered for high efficiency!

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GRAVITY FILLERS
5 to 12 Spouts

- For all types of foamy and still liquids.
- Spouts have *no* packing, eliminating danger of contamination.
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NEW IMPROVED Colloids

can solve your gelling thickening, suspending, or stabilizing problems

Krim-Ko's uniform, established lines of seaplant derivatives - KRIM-KOgel, KRIM-KOloid, KRIM-KOid, KRIM-KO Tendersel and *CARRAGAR* — have proven remarkably effective and dependable in a wide range of food, industrial and pharmaceutical applications. These proven, uniform colloid agents can be as useful to you as they are to some of this country's largest and most successful manufacturers and processors. Tests have proven that they gel, thicken, suspend and stabilize better than most materials heretofore obtainable. Their dependable uniformity makes them especially easy to use.

Send in your problem to our laboratory—no obligation

Krim-Ko maintains a complete well-staffed laboratory devoted exclusively to the solution of problems in this field. If you have a problem involving emulsifying, thickening, suspending or stabilizing—send it in to us. Our laboratory will make their recommendations in confidence—without obligation or cost. Or if you prefer—we will send you sufficient working samples for your own laboratory. Write today.

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FOOD PROCESSOR

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Vitamin A Activity characteristic of "June" butter and natural plant materials offered as—
CAROTENE
in vegetable oil, powder, emulsion and crystalline forms. A most economical source of Nature's own palatable
VITAMIN A
Available in several convenient potencies for food and pharmaceutical use. Immediate delivery. Write or wire.
GENERAL BIOCHEMICALS, INC.
50 LABORATORY PARK — GBI — CHAGRIN FALLS, OHIO
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CARROT OIL
makes foods
golden yellow
Carrot oil, like butter, contains carotene. Carrot oil is extracted from carrots, and each pound contains up to 25 million units of carotene, the international standard of vitamin A.
Carrot oil is preferred for vitaminizing foods because it is a natural vegetable oil, and because it contributes vitamin A of high stability and desirable golden yellow color. Carrot oil is not synthetic, does not contain animal fats of any kind, and does not produce fishy flavor.

SEND FOR BOOKLET
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205 Broad St., South Whitley, Ind.

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must be received by March 22nd to appear in the April issue.
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FOOD INDUSTRIES
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Chemical and biological analyses of food materials and products. Food plant design, inspection, process examination and control. More than 75 years of experience serving the food and beverage industries.
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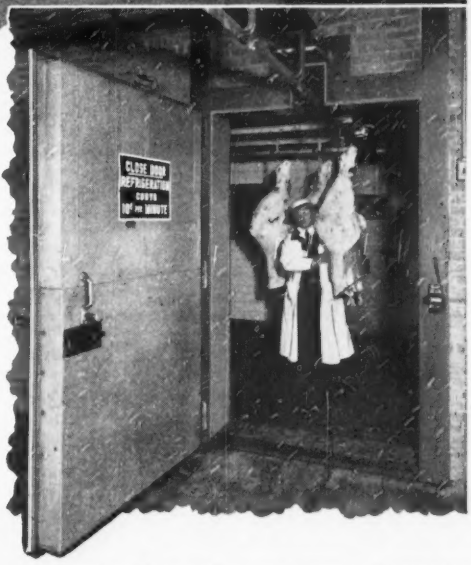
AT TOBIN PACKING CO., INC., ALBANY, NEW YORK

TRACK DOORS SPEED HANDLING— SAVE REFRIGERATION

Fast movement of material in and out of the refrigerated space by monorail is possible with Jamison Track Doors which permit free passage of the trolley. The Jamison freezer doors illustrated are not only metal clad but they have an additional metal kick plate on the bottom to protect against possible battering from trucks.

An unusual feature of this installation is the all-steel frame in which the door is hung. The three E-Z-Open Fasteners assure uniform gasket compression for a good seal all around.



The standard line of Jamison doors will meet the majority of user requirements for temperatures, dimensions, applications.

For detailed information on these and other Jamison Cold Storage Doors, request Catalog 175.

JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

The oldest and largest builder of cold storage doors in the world

JAMISON COLD STORAGE DOOR CO. • HAGERSTOWN, MD., U. S. A.

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STANDARDIZED CANE SUGAR SYRUP

made by a manufacturer with over 38-years of KNOW-HOW!

CONTROL your batches by the turn of a valve...
DECREASE your labor costs....
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ELIMINATE bag dust, lint, and sugar spillage...

by the use of a stable, uniform **LIQUID SUGAR**

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DISCOUNT OF 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals).

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SAN FRANCISCO: 68 Post St. (4)

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SALARIED PERSONNEL $3,000-$25,000. This confidential service, established 1927, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. F, 241 Orange St., New Haven, Conn.

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needs FOOD TECHNOLOGIST

for product control department. Meat industry experience necessary. Advanced training desirable but not essential.
BIOCHEMIST for product research department. Graduate training or advanced degree required with well rounded knowledge of instrumental techniques and enzymology.
Submit personal and professional data, application picture and general salary range with first letter.

P-2068, Food Industries
330 W. 42nd St., New York 18, N. Y.

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(Continued on the opposite page)

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P-2451, Food Industries
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Salaried Positions, $4,000 to $30,000. This Confidential service for men who desire a new connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details.

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Junior and Senior deg. men
TECH'L DIRECTOR Ph.D., foods-to $25,000
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UNION Rebuilt Machinery Established 1912

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J. H. Day 700 gal. Steam Jacketed Jumbo Mixers, motor driven.

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Day & Robinson 100, 600, 1000, 2400, 4000 lbs. Dry Powder Mixers and Sifters.

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Knapp E adj. Wraparound Labeler, also jars with ears and Spot Label Attachment.

Burt Automatic Wraparound Labeler.

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Triangle Package Models G2C and A60A Electri-Pak Fillers.

Triangle SHA Auto. Net Weigher, High Speed adj. Semi-Auto. Carton Sealer.

Standard Knapp No. 429 Carton Sealer, 10 ft. Compression Units.

Package Machinery Co. Model FA and FA2Q Wrappers; Hayssen 3-7, Knapp JS and Scandia SSU1 Automatic Cellophane Wrappers.

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Filler 1, 2, 4 and 8 head Stainless Steel Automatic Piston Fillers, Rising Bed feature and automatic Feed.

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TOP PRICES PAID FOR YOUR SURPLUS EQUIPMENT

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(Continued from opposite page)

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FOOD TECHNOLOGIST: with experience in production, quality control, inspection, product development. Age 38. M. S. degree. Have worked on variety processed foods and specialties, including food chain and restaurant supplies. PW-2420, Food Industries.

CHEMICAL ENGINEER, Food Technologist B.E. (1950), Canadian. Practical experience in administration. PW-2409, Food Industries.

POSITION WANTED: Food Technologist M.A. degree, age 34, wide experience in food industry in research, customer service, and adjustment department of can manufacturer. PW-2412, Food Industries.

FOOD TECHNOLOGIST and horticulturist 32, with wide field and laboratory experience desires change of position. Box 273, Duluth, Minn.

BUSINESS OPPORTUNITY

Space Available

in modern plant for manufacturing food products. Steam and water furnished. Can also furnish outlet for substantial part of production. BO-1708, Food Industries.

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With margarine tax repeal July 1st, here is an excellent opportunity for a new organization or established firm. Two-man team, fully qualified with outstanding backgrounds and years of experience in production, development and control of all types of margarine. BO-2179, Food Industries.

FOR SALE

Going business, manufacturing, well established line of Coffee Syrups. Further particulars, write

BO-2406, Food Industries
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WANTED

Large engineering firm wishes to acquire several complete food plants through purchase of (1) capital stock, (2) assets, (3) machinery and equipment, whole or in part. Personnel retained where possible; strictest confidence.

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One used #3TH Mikro Pulverizer with or without motor. Send photograph or describe condition accurately. No dealers.

W-2234, Food Industries
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FOR SALE

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100 barrel capacity, excellent condition, R.R. siding, well located to serve Ind., Mich., Ohio; good labor market. Priced to sell.

BO-2228, Food Industries
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Reduce Your Shipping Costs

Closeouts on surplus stock — Don't buy Your Corrugated Cartons or Folding Boxes until you see us.

BERRY BOX CO., INC.
1013 Broadway Brooklyn, N. Y.
Tel. Glenmore 5-0402, 8906
We also buy surplus cartons.

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b. Food Analysis
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e. Freezing
f. Preserving
g. Inspection and Grading according to USDA standards
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Telephone: 83-1301

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WELL PUMPS and HOMOGENIZER

Well pumps, Centrifugal, electric-driven, complete. 3 phase, 60 cycles, 230 Volts.
Union Pump, stainless steel, 15 H.P., 3 phase, 60 cycles, 220 Volts, 300 gallons per hour at 3000 lbs. pressure.

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PNEUMATIC SCALE CO. 35 Per Minute.
AUTOMATIC CARTONING LINE
Automatic Feeder, Bottom Sealer, Filler, Top Sealer & Compression Unit

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STANDARD 429 Top & Bottom Case Sealer
WORLD Automatic Rotary Labeler
STANDARD-KNAPP, BURT Can Labelers
N J Pony Labelrite Labelers, Model ML, MX
NATIONAL, WORLD, ERMOLD Spot Labelers.
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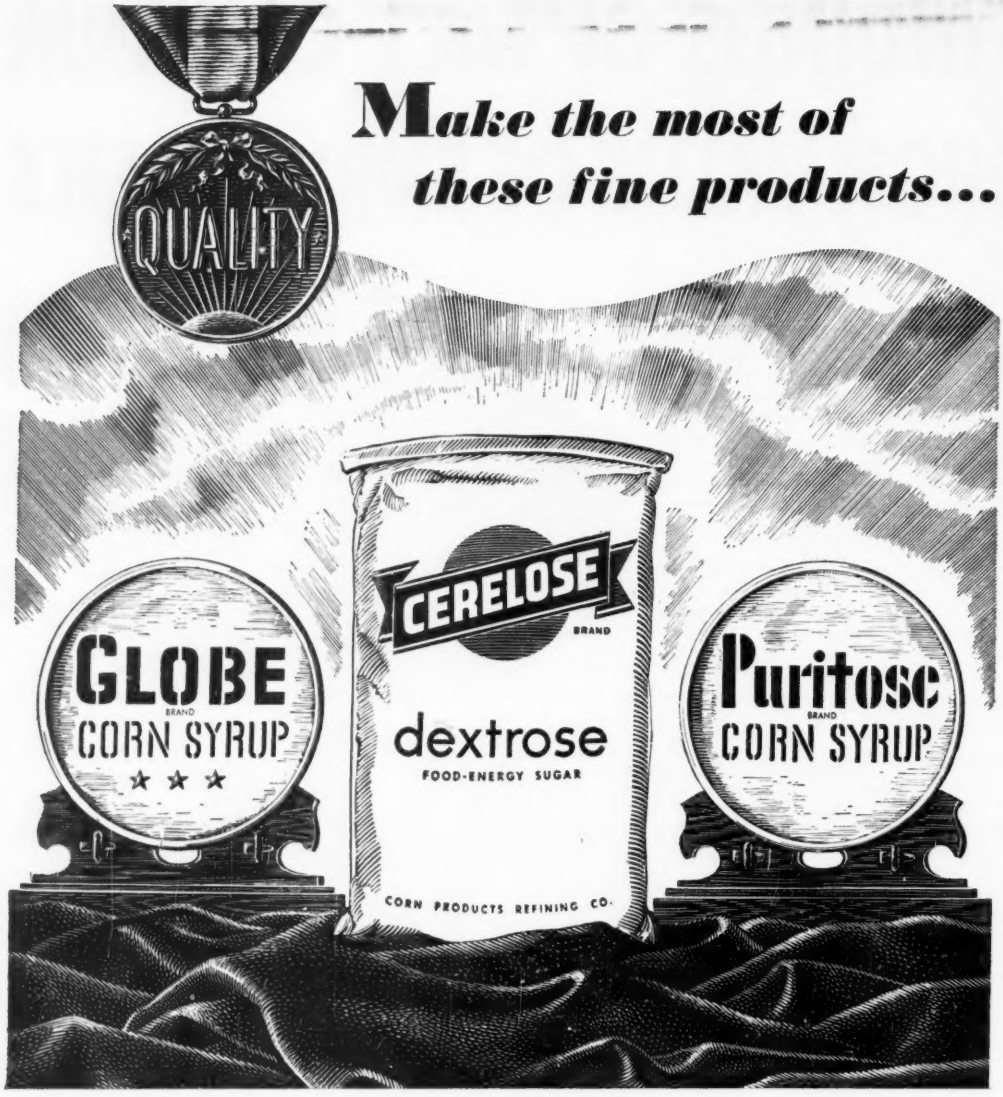

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How to pack a wheel bearing and

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1. Place a *small amount* of *Texaco Marfak Heavy Duty* on fingers of one hand. Hold bearing (cleaned with kerosine, and thoroughly dried) as shown – small diameter facing out.

2. Turn bearing over (so large diameter faces out) into hand holding *Marfak Heavy Duty.* Work lubricant into spaces between rollers by kneading with fingers until it comes through on small diameter side.

3. Small diameter side of bearing, showing how *Marfak Heavy Duty* has been worked all the way through spaces between rollers. Repeat working-in operation around bearing until all spaces between rollers are packed.

4. All spaces between rollers have now been packed. Always work in steps, using small amount of *Marfak Heavy Duty* each time. Too much will cover bearing, prevent telling when grease is worked in properly.

5. Hold bearing as shown and spread additional *Marfak Heavy Duty* around the outside. Use enough to cover the tops of rollers with about 1/8-inch of lubricant. Spread evenly and smoothly.

6. Here is a bearing properly packed with *Texaco Marfak Heavy Duty.* Such a bearing will have full protection during the scheduled repacking intervals, plus many thousands of miles of additional bearing life.

TEXACO MARFAK HEAVY DUTY provides fluid lubrication inside wheel bearings but retains its original consistency at the edges. Thus, it seals itself in, seals out dirt and moisture, protects against rust. Safer braking is assured, and bearings last far longer. No seasonal change is required.

In chassis bearings, use *Texaco Marfak.* Even the roughest service won't pound or squeeze it out. It protects against wear and rust for extra hundreds of miles. Chassis parts last longer, maintenance costs are reduced.

For lower *engine* maintenance costs, lubricate with *Texaco D-303 Motor Oil.* It is fully detergent and dispersive, keeps engines clean – thus reduces wear, assures better performance and longer life for all engine parts.

Let a Texaco Lubrication Engineer help you reduce your automotive maintenance costs. Call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd St., New York 17, N. Y.

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